

EVERYBODY QUOTES NETWORKWORLD





NETWORK WORLD

DURING THE PAST SIX MONTHS, 49 PUBLICATIONS
WITH A COMBINED CIRCULATION OF

8,935,654

HAVE MENTIONED US IN THEIR EDITORIAL PAGES.

The New York Times

Military Jitters Over Internet

By Reuters

Fearful that computer hackers could invade Pentagon data networks, officials of the Defense Department are moving to limit military links to the Internet, the backbone of the emerging advances in information technology, a computer magazine said yesterday.

Network World said a plan to add a protective gateway to Milnet, the worldwide military data network, has touched off an uproar among computer users inside and outside the Pentagon.

A brief notice from the Defense Department's network planning group said the gateway was to be introduced early in 1994, the magazine said, though the plan has not yet

been carried out.

A spokeswoman for the Pentagon had no comment on the report but said the department closely monitored computer work against work against she said.

Network plan a way of elect flow net

"NETWORK WORLD said a plan to add a protective gateway to Milnet...has touched off an uproar among computer users inside and outside the Pentagon."

— The New York Times

Investor's Business Daily

TEN YEARS AFTER: It's been 10 years since the federal government broke up Ma Bell. To be sure, major benefits have resulted from the divestiture, including sharply lower long-distance rates and more services. But phone customers tend to view the breakup as a mixed blessing, according to Network World (Dec. 20). In place of an autocratic and unresponsive telephone giant, say observers, there are seven regional Bell holding companies all going their own ways and making it difficult for users to set up nationwide networks.

One user suggested that smaller business customers are especially confused by the breadth of choices available in the wake of divestiture.

In some

Long-Distance Picture

Before and after divestiture

1984 Market Share



TIN

Roadblock

A number of projects have been postponed. The rollout ways are information working

"...phone customers tend to view the breakup [of Ma Bell ten years ago] as a mixed blessing, according to NETWORK WORLD..."

— Investor's Business Daily

New

Computer Shopper
CNN Moneyweek
Los Angeles Times
Network World
Houston Chronicle

• headline
• casualties
• stalled in the break-down lane
• road kill
• ditch side street
• dead end
• pileups
• jackknifing

ISSUE 124

NETWORK WEEK

CrossComm Corp, Marlborough, Massachusetts router manufacturer, is to buy a stake of about 33% in struggling Westborough-based Proteon Inc, according to Network World.

30 MAY-3 JUNE 1994

The Detroit News AND Free Press

How to navigate the Internet

On the Internet, they're getting ready for the riff-raff — you and me.

Luckily, people such as Ann Arbor resident Catherine Kummer are helping us find our way around. Kummer is coauthor of a guide to personal-finance information available on the Internet. It's one of many, many publications — some are available in bookstores, others online — that you will want to know about if you're going to come aboard cyberspace's mother ship.

You're likely to do just that soon, if you haven't already, because it's getting easier and easier to connect to the Internet, the global web of computer networks.

It's getting easier to enter the info web, but first-time users will want a guidebook

Quey with Jeanne C. Ryer, doesn't go into much depth, but it uses plain English to describe the Internet and some of its resources. Al Gore (or one of his staff members) wrote the foreword.

■ The Internet Guide for New Users, by Daniel P. Dern (McGraw-Hill, \$27.95). This is

Dummy's Guide to the Internet, by Adam Gaffin, senior writer for the trade journal Network World. The guide was funded by the Electronic Frontier Foundation, a Washington-based organization promoting civil liberties in, and access to, cyberspace.

Whether you're a big or dummy, or even if you know

something about the Internet, learn something from it.

It's available via Internet Transfer Protocol: you have a direct connection. You can guide from the Forum on the TROIT: library's form.

Whether you're a big or dummy, or even if you know something about the Internet, learn something from it.

The Washington Times

Pentagon seen limiting links with Internet

NEW YORK (Reuters) — U.S. defense officials, fearful that computer hackers could invade their data networks, are moving to limit military links to the Internet — backbone of the emerging information superhighway — a computer magazine said yesterday.

Network World said a plan to add a protective gateway, also known as Milnet, off an uproar among both in

“One of the best documents about Internet...is called The Big Dummy's Guide to the Internet, by Adam Gaffin, senior writer for NETWORK WORLD.”

— Detroit News and Free Press

are also linking up.

Meanwhile, new software is making it easier to find your way around. One such package comes from the Pipeline, a New York City-based commercial operation that sells Internet access and provides a Windows-based navigation program. Another is called Mosaic. More are on the way, and I'll tell you about them in an upcoming column.

All of this means that the Internet, once the province of the research and technical elite, is quickly going mainstream. Yet because the Internet itself remains so decentralized — and, without special software, so difficult to navigate —

■ My favorite book about the on-line beyond the Internet User's Encyclopedia and Aboba (A looks for the Internet)

had no comment on the department's looking at ways to protect work against hackers

she said.

Network World said plan argued that the electronic mail and data transfer between Milnet users around the world.

On-line

■ One of the best documents about the Internet, on the Internet page, is called

U.S. seeking to limit links to defense data

NEW YORK — U.S. defense officials, fearing computer hackers might invade their data networks, are moving to limit military links to Internet, backbone of the emerging information superhighway, a computer magazine said Monday.

Network World said a plan to add a protective gateway known as Milnet, has touched off an uproar among computer users both in and out of the Pentagon.

A brief notice from the Defense network-planning group was due

Boston Business Journal

More non-tech firms do business on Internet

by JOHN B. MCCRIGHT
JOURNAL STAFF

The Internet is more than a high-tech toy, it may be the future of business. “If you expect to be doing business in the year 2000, you need to be on Internet,” said Mark Gibbs, a columnist on Internet issues for Network World and principal of Ventura, Calif.-based consulting company Gibbs & Co.

Increasingly, Massachusetts businesses are paying attention to such trends. The number of companies doing business on the Internet is growing. About 100 New England companies have profitably done business on the Internet.

“If you expect to be doing business in the year 2000, you need to be on Internet, said Mark Gibbs, a columnist...for NETWORK WORLD.”

— Boston Business Journal



THE CHRISTIAN SCIENCE MONITOR

Pentagon said to restrict access to Internet

US defense officials, worried that computer hackers could invade their data networks, are moving to limit military links to the Internet — backbone of the emerging "information superhighway" — a computer magazine said Jan. 10.

Network World said a plan to add a protective gateway, or relay, to the worldwide Defense Data Network — also known as Milnet — has touched off an uproar among computer users both inside and outside the Pentagon.

A brief notice from the Pentagon said the move was part of a 1994, the department's network gateway was

"This week, Mr. Gibbs...in conjunction with the publication NETWORK WORLD (is) giving seminars on how to create an Internet business."

—Christian Science Monitor

THE MIDDLESEX NEWS

Proteon mum on CrossComm report

By the News Staff
WESTBOROUGH — Proteon Corp. is remaining tightlipped about news reports this week that CrossComm Corp., a Marlborough computer networking company, is trying to buy a major chunk of its business.

Network World reported last Monday that CrossComm and Proteon have come to an agreement under which CrossComm would acquire a 33% stake in Proteon.

products by purchasing stock in the struggling company.

The weekly enterprise networking publication also cited sources saying that some parts of Proteon's hub business may be included in the deal.

Lacey Brandt, Proteon's director of investor relations, said Friday she could not comment on the story. "He said the deal is not yet acknowledged," she said.

engaging in conversations with a number of companies about a variety of relationships."

Proteon would only comment on a "done deal," she said.

According to Network World, CrossComm will acquire one-third of Proteon's 14 million outstanding shares, putting the deal between \$30 million and \$40 million.

CrossComm officials could not be reached for comment.

COMPUTERGRAM

INTERNATIONAL

CROSSCOMM SAID TO BE LOOKING TO BUY A 33% STAKE IN TROUBLED PROTEON

CrossComm Corp., Marlborough, Massachusetts router manufacturer, primarily making local area networks, is to buy a stake of about 33% in Proteon, a Westborough-based computer networking company, according to Network World.

The deal would be worth \$30m to \$40m, Proteon says. Proteon has already said it is exploring

DATAMATION

OnTrack and CSA Help World Trade Center Recover

OnTrack Data Recovery Inc. and Contingency Strategy Associates Inc. (CSA) are offering services to users whose data and equipment were damaged in the World Trade Center bombing. As reported in the 29th issue, OnTrack has established a hotline for suggestions on recovering data from smoke-damaged equipment. The toll-free number is 1-800-368-3688. One suggestion the company has is to "operate a drive if it is available by

"As reported in NETWORK WORLD...OnTrack has established a hotline that offers suggestions on recovering data from smoke and fire damaged equipment." (after World Trade Center bombing)

—Datamation

AS THE COMPUTER INDUSTRY MOVES FROM THE
DESKTOP TO HIGH SPEED NETWORKS, NO OTHER
ENTERPRISE NETWORK COMPUTING PUBLICATION
IS QUOTED MORE FREQUENTLY THAN

NETWORK WORLD



NETWORK WEEK

Oracle's "Notes competitor" due soon

Lotus Development Corp's success with its Notes groupware package is attracting the opposition and last week Oracle's chief executive Larry Ellison declared his forthcoming Oracle Documents as "a true Notes competitor". He said the magazine Network World that the software due in the second half of the year will add audio, video and SQL-based data in addition to documents. It doesn't sound cheap since it will need a Unix server running Oracle7, where Notes, in its low-end incarnation, can get by on a Windows machine. Documents of Oracle Office Improvement to replicate database work. Ellison said that Documents launched with an allied product, Oracle TextServer, and unstructured document

"Oracle Corp.'s chief executive Larry Ellison... told US magazine NETWORK WORLD that the software (competitor to Lotus Notes), due in the second half of the year will handle audio, video and SQL-based data..."

— London Network Week

ST. LOUIS POST-DISPATCH U.S. To Limit Internet Access

© 1994, Reuters News Service

NEW YORK — U.S. defense officials, fearful computer hackers could invade their data networks, are moving to limit military links to the Internet — backbone of the emerging information superhighway — a computer magazine said Monday. Network World said a plan to add a protective gateway, or relay, to the worldwide Defense Data Network — also known as Milnet — has touched off an uproar among computer users in and out of the Pentagon.

gateway was due early in 1994. But so far the plan has not been implemented, and Internet users said Monday they still had direct computer links to the Milnet.

A spokeswoman for the Pentagon had no comment on the report, but said the department closely monitored computer security. "We are looking at ways to protect the network against hackers," she said.

Network World said critics of the plan argued that the security relay could not handle the volume of electronic mail and data that now flows between Milnet and Internet

The Orlando Sentinel

Defense plans to limit its links with Internet for security purposes

REUTERS

NEW YORK — U.S. defense officials, fearful that computer hackers could invade their data networks, are moving to limit military links to the Internet — backbone of the emerging information superhighway — a computer magazine said Monday. Network World said a plan to add a protective gateway, or relay, to the worldwide Defense Data Network — also known as Milnet — has touched off an uproar among computer users in and out of the Pentagon.

A brief notice from the Defense Department's network planning group said the introduction of the gateway was set for early this year, the magazine said.

But so far the plan has not been implemented, and Internet users said Monday they still had direct computer links to the Milnet.

A spokeswoman for the Pentagon had no comment on the report, but said the department closely monitored computer security. "We are looking at ways to protect the network against hackers and viruses," she said.

Critics of the plan argued that it could not handle the volume of data that now flows daily between Internet users around the world. Less-dramatic security measures in the industry to protect computer access have apparently

"NETWORK WORLD said critics of the plan argued that the security relay could not handle the volume of electronic mail and data...between Milnet and Internet users around the world."

— Orlando Sentinel

Business Marketing

Day Has Come'

"The networking revolution continues to explode, says Evilee Thibeault, VP-Marketing at NETWORK WORLD...There's a major move to inter-network smaller computer groups..."

— Business Marketing

NetWo

Headliners such as Microsoft, Lotus, Intel, Ungermann-Bass, WordPerfect and Novel worked cramped quarters to capture the attention of a NetWorld '93 crowd that clearly believed its day had come.

"The networking revolution continues to explode," says Evilee Thibeault, VP-Marketing at NETWORK WORLD, a weekly, an inter-network newsweekly, an inter-network leader with a 150,000

NETWORLD '93 BOSTON



ware is the... bring together electronic personal calendaring and scheduling.

Maynard Electronics and Canon USA made it clear they plan aggressive marketing campaigns for their products. Lake Mary, Fla.-based Maynard Electronics, which markets storage-backup software, says its "Yes, Enough Said" campaign will be promoted through print and direct mail, electronic and co-op with dis-

largest... just launched the... what is expected... million integrated... fort that will in... ads in trade ar... lications, a dir... and trade sh... Intel Cor... proach to... quests m... putting a... badge... pertine... by th... was... pri...

Community College Times CAUSE for Celebration

District, Miami-Dade Administrator
Recognition from Technology Association

INFORMATIONWEEK GOSIP ABOUT TCP/IP

Network World, July 26, P. 1. Prompted by the Department of Energy, the National Institute of Standards and Technology has agreed to review the idea of including TCP/IP products in the Gosip federal data processing mandate. The review could mark the beginning of the end for the Open System

ad
ports

EGO -- The Maricopa Community College District, AZ, has won a national award for excellence in information technology net-

district last month was presented the CAUSE Award for Excellence in Campus Working. CAUSE is the Colorado-based Association for managing and using information technology in higher education. Albert LeDuc, director of computer services at Miami-Dade Community College, FL, also won the award from CAUSE. He was

Ron Bleed, Maricopa's vice chancellor for information technologies, said the district is honored to receive the award.

"The Maricopa system is so spread out, and we knew long ago that the real benefit of the network would be improved communication for students, faculty, and staff," Bleed said. "This has, indeed, proven to be the case. Focus of the network has been to continuously improve teaching and learning -- and that is of the utmost importance to our students and community."

The award was presented only a few days after the Maricopa system received an honorable mention for user excellence from the editors of Network World magazine. Honors were presented to organizations successfully "adapting (technology) networks to achieve strategic

"NETWORK WORLD...has agreed to review the idea of including TCP/IP products in the Gosip federal data processing mandate."

— Information Week

planning... network activities with...

are probably more technically elaborate, but I doubt you'll find one as open, accessible, or egalitarian than...
Jan Baltzer, director of computing

The Boston Globe

AT&T's InterSpan lags behind demand

Lack of capacity creates bottleneck for some companies seeking access

ASSOCIATED PRESS

Unexpectedly high demand for AT&T's new InterSpan high-speed data network has led to a bottleneck for some companies that want access to the information superhighway.

The AT&T frame relay service is meant to replace standard telephone lines for faster and more reliable transmission.

But Jeff Smith, communications engineer at Perot Systems Inc. of Dallas, told the weekly trade paper Network World that the delays have been noticeable in Texas.

"The current AT&T overbooked."

some computer transmissions over the high-speed line, the framing-based transmission is being released

"But Jeff Smith...told the weekly trade paper NETWORK WORLD that the delays [in AT&T's InterSpan hookups] have been noticeable in Texas."

—Boston Globe

Toronto Globe

Internet on defensive

U.S. defence officials, fearful computer hackers could invade their data networks, are moving to limit military links to Internet — the backbone of the emerging information superhighway — a computer magazine says.

Network World says a plan to add a protective gateway, or relay, to the worldwide Defence Data Network — also known as Milnet — has touched off an uproar among computer users both in and out of the Pentagon.

A brief notice from the Department's

Network World said critics of the plan argued that the security relay could not handle the volume of electronic mail and data that flows daily between Milnet and Internet users around the world.

10 other customers expect bottlenecks. There have been "imbalance" on the widespread. According to (re-engineering) Tommie said. People on, there is transmission.



TECHNOLOGY

They

GOVERNMENT TECHNOLOGY

STREAMLINED WORKFLOW SOLVE PROBLEMS

Continued from page 1

information, rather than just processing it. Networks of computers are expanding throughout state and local government, bringing large amounts of information to people electronically.

As the ability to quickly move more data through the network pipeline has improved, so has the ability to link computers with different operating systems. Improved protocols and gateways have helped smooth some of the bumps in the networking road. Network management, another problem that has grown with the proliferation of LANs, is expected to become increasingly automated, to the point where computer networks will even take care of themselves.

"According to NETWORK WORLD Magazine, CDDI can deliver just as much data as Fiber Distributed Data Interface (FDDI), but at less than half the cost."

— Government Technology



This WaveLAN card provides a wireless alternative to traditional LANs.

LOCAL AREA NETWORKS

Local area networks first began to appear in the late 1970s, and their effects were immediate. Organizations found the cost of sharing resources, such as printers, could be reduced over tens or hundreds of individual computers.

large amounts of data at high speed — has proven costly to implement. Competing alternatives, such as Copper Distributed Data Interface (CDDI), and Asynchronous Transfer Mode (ATM) — that can transmit as much data on copper wire as fiber-optic cable — have begun to appear. According to Network World Magazine, CDDI can deliver just as much data as Fiber Distributed Data Interface (FDDI), but at less than half the cost.

play a growing role in government as networks expand. A number of states are already using their statewide networks to deliver video courses to students in remote areas. Networks are also expected to take advantage of multi-media technology and local government service.

network portion of a central point, kiosks much more versatile

WIRELESS

Until recently, networks were based on wires or other carriers to carry signals from one place to another. Wireless technology is one day expected to eliminate the need for wires. The same technology that has made it possible to produce portable computers and notebooks is now being used to make it possible to produce wireless networks. The same technology that has made it possible to produce portable computers and notebooks is now being used to make it possible to produce wireless networks.

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'Net pioneers see no end to their grand experiment

But global net faces political, technical tests.

First in a two-part series.

BY ADAM GAFFIN

It was supposed to be an experiment. Instead, 25 years after its first two computers were linked, the Advanced Research Projects Agency Network (ARPANET) has turned into the global Internet with 3.2 million hosts and millions of users. What started in a computer room at the University of California, Los Angeles, today provides everything from electronic mail to satellite images

of cometary explosions and has even become the subject of cartoons in the *New Yorker*.

"We had no idea what we were creating," said Leonard Kleinrock, chairman of the computer science department at UCLA, home to the first node on the network, originally sponsored by the Department of Defense's Advanced Research Projects Agency. Kleinrock was one of several ARPANET founders who spoke to *Network World*.

On Sept. 10, the ARPANET's build-
See Experiment, page 61

25 INTERNET

Bank advocates cautious course to client/server

BY BARB COLE

Brooklyn, N.Y.

For end users at The Chase Manhattan Bank, N.A.'s credit card division, getting at 64 databases is now as easy as accessing just one.

That's one of the biggest benefits of a downsizing project that involved taking a core data warehouse application from an SNA host and distributing it within a TCP/IP-based massively parallel processor (MPP) machine running 64 copies of Sybase, Inc.'s SQL Server.

While Chase would eventually like to gain the rewards of a true distributed database deployed across networked machines, the bank found the bandwidth needed was just too expensive, according to Jane Landon, systems vice president of advanced technologies at the bank.

Meanwhile, moving the data off an Amdahl Corp. mainframe to a 128-processor AT&T Global Information Solutions (GIS) system running a beta version of Sybase's Navigation Server software has cut response times for



Chase Manhattan's Landon

some database queries from several days to a few minutes. Not only that, but Chase has been able to give its employees a wider choice of data access tools.

See Bank, page 6

Reality Check

Product: Phase/IP
Company: TGV, Inc.

The benefits:

- Lets users access DECnet applications via TCP/IP.
- Provides DECnet-to-IP integration without tunneling.

The drawbacks:

- Requires TGV's MultiNet 3.3.
- Requires name-mapping table to address DECnet nodes running older versions of OpenVMS VAX and OpenVMS AXP.

The user view:

"It makes the implementation of DECnet/OSI irrelevant."

R. Kevin Oberman,
Engineering network
manager, Lawrence
Livermore National
Laboratories

TGV steers users off DECnet/OSI

BY JIM DUFFY

Santa Cruz, Calif.

TGV, Inc. will pound a nail into DECnet/OSI's coffin this week when it unveils software that lets users access DECnet applications using TCP/IP.

TGV's Phase/IP, as well as a forthcoming DECnet-over-TCP/IP product from Digital Equipment Corp., will free users from reliance on DECnet/OSI for continued support of DECnet applications. As things stand, users must implement DECnet/OSI if they want to retain existing applications because Digital is retiring DECnet Phase IV-only protocol code.

Analysts said Phase/IP, which is middleware that works with TGV's widely used MultiNet Transmission Control Protocol/Internet Protocol software, will make it easier for users to integrate OpenVMS systems with other

platforms across the enterprise.

"People are moving to TCP/IP," said Cindy Santisario, research manager for computer networking architectures at International Data Corp. in Framingham, Mass. "It's the only protocol that can offer end-to-end connectivity from the PC to mid-range systems — proprietary or Unix."

Phase/IP provides the full DECnet application program interface over TCP/IP, meaning standard file-transfer, task-to-task and electronic mail applications can run as though they were written for TCP/IP. Users can even access those applications using familiar DECnet commands.

Prior to Phase/IP, DECnet users had only two choices for adopting TCP/IP: They could abandon DECnet applications and replace them with TCP/IP

See TGV, page 60

MS Mail bundle targets Notes

BY KEVIN FOGARTY

Redmond, Wash.

Hoping to placate customers waiting for delivery of its heralded groupware product, Microsoft Corp. will begin bundling third-party conferencing software with copies of Microsoft Mail at no additional cost.

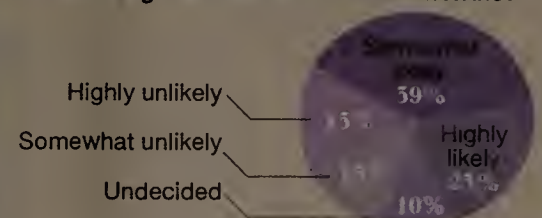
Sources said Microsoft will include The Mesa Group, Inc.'s Conference+ with the \$50-per-seat Mail to establish a beachhead in the groupware market dominated by Lotus Development Corp.'s Notes.

Microsoft is also going after Notes on another front. It is pursuing talks with the Big Three U.S. long-distance companies and large overseas carriers to establish its upcoming Exchange groupware as the

See MS Mail, page 8

I want my switched token ring

How likely is it that you will deploy token-ring switching over the next 18 to 24 months?



Based on a survey of 77 users.

GRAPHIC BY TERRI MITCHELL SOURCE: SAGE RESEARCH, NATICK, MASS.

Token-ring shops discovering the joys of switching

BY SKIP MACASKILL

Token-ring users no longer have to take a backseat to their Ethernet counterparts who are enthusiastically embracing switching technology.

While the benefits of Ethernet switching have gotten all the attention, token-ring switching has been a distant blip on the radar screen.

But that is changing.

The technology has been thrust into the limelight of late with a rash of announcements from vendors such as Madge Networks, Inc. and Centillion Networks, Inc., as well as IBM and Kalpana, Inc., which last week promised to codevelop token-ring switching products.

Standard Microsystems Corp. already delivers a switching product, and Proteon, Inc. will soon announce its intention to develop switched token ring.

See Switching, page 60

INSIDE

▶ ATM switches on trial

Engineers at the University of Colorado fired up four ATM switches, found some bugs and learned some valuable lessons about ATM. **Page 43.**



▶ The compatibility verdict

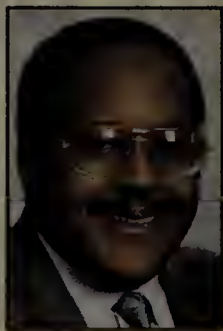
Part 2 of our special report about the interoperability of ATM products and services appears in the Enterprise Internets section. **Page 20.**



Briefs

Expanding NT. AT&T and Microsoft Corp. last week said that they will share development efforts promoting Windows NT as an enterprise operating system. AT&T Global Information Solutions this year will deploy Windows NT Advanced Server for Unix Systems, which can act as a peer server to Windows NT servers in mixed networks. AT&T will also help Microsoft enhance Windows NT with on-line transaction processing and high-availability backup technology.

Clear vision. In its first full year of operations, OpenVision, Inc. has achieved \$20 million in revenue and corralled 1,000 customers, said Michael Fields, chairman and chief executive officer. To maintain that momentum, the company last week announced a repackaging of its systems management product line into point products, application suites and packages for mission-critical environments, as well as a plan to align with other management application vendors for integration projects.



How lite is lite? Notes Express, the low-end Lotus Development Corp. Notes client due out next month, will give users electronic mail, access to Notes discussion databases and a small set of simple applications, such as to-do lists, according to those who have discussed it with Lotus. What it will not allow is access to more advanced Notes applications, such as workflow.

Low-Fibronics diet. Fibronics International, Inc. next week will roll out a smaller version of its 12-slot intelligent GigaHub. According to industry sources, the new four-slot version will be targeted at small backbone applications, as well as large departmental or workgroup networks. The company is also expected to unveil its first fast Ethernet module for the GigaHub.

Oh, never mind. Oracle Corp. last week said that it has ended discussions with Gupta Corp. concerning a merger. Instead, the Redwood Shores, Calif.-based Oracle said it will compete against Gupta beginning next year in the front-end tool arena with its own object-oriented offering, code-named Project X. Last month, Oracle disclosed that it had purchased more than 7% of Gupta's stock and was considering a merger.

Big Blue-light special. Kmart Corp. of Troy, Mich., announced that it would migrate away from its IBM Professional Office System (PROFS) electronic mail system to Microsoft Mail by 1997. It will also expand its number of E-mail seats from 4,500 to 10,000, said Gary Galunas, Kmart systems manager for corporate communication. Galunas said the switch will improve communication between headquarters and field offices.

MCI moves. MCI Communications Corp. and Motorola last week announced a joint marketing agreement for frame relay products and services. The two will be selling MCI's HyperStream Frame Relay Service and Motorola's customer premises equipment.

In other news, MCI submitted a local competition plan to the Illinois Commerce Commission, which is scheduled to open an inquiry Thursday.

In search of excellence. You've used networking technology to push your company ahead of the competition. Tell your peers how you did it and win some much deserved recognition by entering the Tenth Annual Network World User Excellence Awards.

Submit a 250- to 500-word abstract by Aug. 29 describing your project and how your company benefitted. Mail to Special Projects Editor, Network World, 161 Worcester Rd., Framingham, Mass. 01701, or fax to (508) 820-1103. You can also E-mail the abstract via MCI Mail at 390-4868 or send it via the Internet at network@world.std.com.

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ADDRESS: Network World, 161 Worcester Rd., Framingham, MA 01701. PHONE: (508) 875-6400; FAX: (508) 820-3467; INTERNET: network@world.std.com.; BBS: Interact with other readers: download free software, submit letters to the editor, leave news tips, change of address requests or hunt for jobs by using your IBM, Apple or other computer to dial into the BBS at speeds up to 9.6K bit/sec by dialing (508) 620-1178 or (508) 620-1160. READER ADVOCACY FORCE (R.A.F.) HOT-LINE: Contact us with story tips about pressing user issues, (800) 622-1108, Ext. 487; NETWORK HELP DESK: Contact Dana Thorat via any of the above means.

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NEWS

Cisco ships a key element of its CiscoFusion architecture for integrating router- and switched-based internets. *Page 4.*

CIX says join or else: Companies exchanging commercial traffic over the Internet should see if their carriers are playing by the new rules. *Page 5.*

General DataComm to unify branch and backbone with low-speed ATM products. *Page 6.*

Industry cracks down on phone fraud. *Page 6.*

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IBM is testing the waters for an electronic software distribution service. *Page 8.*

StrataCom unveils INS, which supports the signaling needed for ISDN access to frame relay and SVCs. *Page 11.*

IBM snatches Transarc to boost OLTP wares. *Page 12.*

ENTERPRISE INTERNETWORKS

Simon says success: Analysts give BellSouth Cellular's personal communicator good technical marks, but remain unsure if it can win over business users. *Page 13.*



Astarte launches the Star-Switch 7200 — a fiber-optic photonic switch that manages FDDI, ATM and LAN links. *Page 13.*

LAN WORLD

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Start-up NiceCom to unveil a product suite to ease the move from Ethernet networks to ATM environments. *Page L1.*

GLOBAL SERVICES

MCI banks on aggressive SMDS pricing to lure new users. *Page 27.*

New wireless consortium, including many of the Bell cellular subsidiaries, emerges to push for acceptance of high-capacity CDMA. *Page 27.*



CLIENT/SERVER APPLICATIONS

IBM bucks up its workflow and groupware offerings with business-process modeling tools to help users get a handle on how work flows through their companies. *Page 35.*

TI sheds its cowboy attitude and saddles up with other vendors to link its apps tools. *Page 35.*

OPINIONS

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- **Scott Bradner** on com-priv discussions. *Page 16.*
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Attention all shoppers

Next week's Buyer's Guide to Group Collaboration Tools classifies Lotus Development Corp. as a department store provider of groupware. Join us to find out more about Notes and its competition.



Network HELP desk

Network World tracks down answers to your questions regarding products, services, technologies or disputes with vendors. Please submit questions to Dana Thorat at (800) 622-1108, via fax at (508) 820-1103 or (508) 820-3467, via the Internet at djt@world.std.com or via CompuServe at 73244,2673.

Our company has a wide-area network, which allows our East Coast office to connect via a 56K bit/sec dedicated line to our Novell, Inc. NetWare 3.11 network in Houston. Similar programs are on both servers except our accounting software, which is on the Houston server only. Because it was almost impossible to run the executable files over the 56K bit/sec line, we installed an access server using Novell's NetWare Access Services (NAS) Version 1.3 and OnLan PC, (the remote dial-in client included with NAS) and attached two modems for dial-up access. Although the system can accommodate as many as 16 users, there is little conventional memory available for each user session. This memory shortage creates severe problems — users are disconnected from access server sessions, and the entire access server sometimes freezes up. We have a substantial

investment in the access server and do not wish to replace it. Is there other software that handles application or access services?

Patricia Hagen, Houston

Ron Nutter, a network systems engineer at Intra-Source, Inc., a Novell Platinum-authorized reseller and service center in Lexington, Ky., replies:

Ideally, the best solution would be to install the accounting software on the local server and go across the 56K bit/sec line for data only. However, this may require you to purchase a second license for the accounting software; you would have to check with the software company to be sure.

There are also a few things you can try to free up more conventional RAM for your users. Check the "Rules of Thumb" packaged with the NAS documentation to make sure all the hardware you are using is on the approved hardware list. NAS can be unpredictable with untested hardware. Some of the "Rules of Thumb" suggest that you use a CGA monitor on the NAS machine, which will allow for more application memory. Also, use a Novell NE2000 net interface card (NIC) rather than one with shared memory, such as the Standard Microsystems Corp.

See Help desk, page 47

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Business

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Cisco ships key component of CiscoFusion architecture

BY JIM DUFFY

San Jose, Calif.

Cisco Systems, Inc. last week said that it has begun shipping a promised Asynchronous Transfer Mode (ATM) switch that is a key element of its CiscoFusion architecture for integrating router- and switched-based internets.

Cisco also broadened a development effort with Chipcom Corp. designed to foster interoperability between Cisco routers and Chipcom switching hubs.

The moves are aimed at helping Cisco maintain a leading role in enterprise internetworks as users migrate from shared-media local-area network-based internets to switched infrastructures. The CiscoFusion blueprint maps out future roles for LAN and ATM switches, and routers in an enterprise net.

Cisco is now delivering the HyperSwitch A100, a 16-port ATM switch that was codeveloped with NEC Corp. It can be positioned as a workgroup switch providing ATM to the desktop or in a data center to provide cell switching across an enterprise backbone.

As envisioned under the CiscoFusion architecture, the HyperSwitch A100 can connect to a central Cisco 7000 route server, which determines how packets are transmitted across the backbone. The switch also connects to multiple routers to send and receive data among shared-media LAN internetworks.

Eventually, the HyperSwitch A100 will assume the route server function of the 7000, according to Cisco.

The device is a 2.4G bit/sec nonblocking matrix switch that supports up to 16 155M bit/sec ATM interfaces. It can buffer as many as 2,000 53-byte cells per port and features priority mechanisms for time-sensitive traffic, such

as video.

HyperSwitch A100 can handle permanent and switched virtual circuits, and interoperates with the Cisco 7000 backbone router via the 7000's ATM Interface Processor module.

"Being a Cisco site, we're very interested in ATM," said Dave Zimmerman, telecommunications analyst at Rutgers University in New

Brunswick, N.J. "We're interested in how we're going to integrate them into our network. But if it doesn't provide any significant advantage over competitors, it's going to be an interesting comparison."

The HyperSwitch A100 chassis will cost \$21,900. The SONET interface is priced at \$1,250, and the Transparent Asynchronous Transmitter/Receiver Interface will cost \$1,050.

Also last week, Cisco and Chipcom agreed to implement Cisco's Internetwork Operating System technology on all Chipcom hubs, from the high-end ONcore Switching System to the

ONsemble Stackable Hubs. This will allow the hubs to perform routing for workgroups and departmental LANs.

Chipcom will provide fault tolerance and reliability features to the combined products. The companies will also make their respective switching products and network management offerings interoperable.

Initial products from the alliance are slated to debut later this year. The agreement is an outgrowth of a 4-year-old relationship between the companies to codevelop router modules for Chipcom's hubs.

©Cisco: (408) 526-4000.

MCI to overhaul data services, reduce pricing

BY JOANIE WEXLER

Atlanta

MCI Communications Corp. this week will announce revamped pricing and packaging of its packet-switched offerings that will slash user bills by as much as 40%.

By consolidating previously disparate components of the X.25-based services gained by acquiring BT North America, Inc., MCI will start offering packet services based on a flat rate of about 8 cents per minute under the brand name Xstream.

The move is the first in a series of service overhauls planned by the carrier intended to "strengthen MCI's full range of data options," said Nancy Jenks, MCI director of applications services marketing.

The goal is to "make it easy to understand and buy" services for remote and mobile applications, such as host-based electronic mail and terminal-to-host-based inventory status checking, she said.

Xstream will blend previously separate services — including local access, installation,

See MCI, page 6

The New RISC System/6000 But They Won't Quite

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IP service providers face traffic shutdown

BY ELLEN MESSMER

Washington, D.C.

The organization managing the gateway for the lion's share of all commercial traffic traversing the Internet last week announced it will block packets from users whose IP service provider does not join the CIX.

The Commercial Internet Exchange (CIX) said Internet Protocol resellers must pay an

annual \$7,500 fee to join the CIX by Nov. 1 or face seeing their customers' Internet traffic filtered out by the CIX's Cisco Systems, Inc. 7000 router when commercial traffic is exchanged.

The CIX now has 69 members, a third of whom connect directly to the CIX router and the rest of which use it for transport.

CIX was set up about three years ago so pro-

viders, no matter how large or small, could pay a single annual fee for the shared routing service. CIX members do not charge each other for transporting packets to the destination network point, thus avoiding the types of settlement charges common in the traditional telecommunications industry.

The CIX arrangement offered a way around the confusing restrictions imposed by the fed-

eral government that prohibit businesses from sending commercial traffic across the subsidized NSFNET backbone, now the backbone of the Internet.

Longtime CIX policy allows members to resell IP service to other carriers only if those carriers join CIX as well. But the explosive growth of the Internet led to increasing violations of the CIX policy.

The five-member CIX board, which includes veteran Internet providers NEAR-NET, UUNET and Performance Systems International, Inc., in a closed-door meeting last month voted to implement a policy to crack down on violations by filtering out traffic. Sprint was the only board member to vote against it. News of the secret vote leaked out (NW, July 25, page 1), generating criticism that CIX policy was a way to punish newcomers to the business and slow down the telecommunication giants getting into the IP connectivity business.

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A member of the club

In the ultimatum posted last week by the Commercial Internet Exchange, a few rules specifically addressed universities:

- A university that provides IP transit only to its students, faculty and researchers is **NOT** required to join CIX.
- A university that provides IP transit to alumni, local businesses and other organizations not directly participating in the university's educational mission **IS** required to join.

LAYING DOWN THE LAWS

Last week, CIX finally made public the rules it will follow in the crackdown that commences Nov. 1.

Organizations or individuals selling shell accounts can count themselves safe from the CIX, but those selling Point-to-Point Protocol or Serial Link Interface Protocol accounts have to join (see graphic).

"Organizations attempting to circumvent CIX policies, such as attempting to disguise the resale status of their customers by subnetting a single network number and sharing its use among multiple customers, will be subject to appropriate enforcement," the CIX rules stated.

Small IP providers now howling that CIX is "criminal" will realize the CIX board's decision is in their best interest, said Bill Washburn, executive director of CIX.

According to Washburn, it would be far more expensive than \$7,500 for a single provider to establish the degree of connectivity the CIX offers.

"This will make it possible for small providers to be in business in the first place," Washburn said. "This is nonrestrictive, and there are no settlements." CIX is now opening an office in Washington, D.C. to represent its interests.

The CIX IP resale ban can endure while it has a virtual monopoly on multiprovider connectivity, but there could be competition for the CIX in the near future.

The federal government is subsidizing three Network Access Points based on the CIX model in New York, Chicago and San Jose, Calif., for four years. Washburn acknowledged the CIX could fade away if its router services become superfluous. ☐

General DataComm poised to offer 56K ATM connections

BY MICHAEL CSENGER

Middlebury, Conn.

General DataComm, Inc. (GDC) is developing low-speed Asynchronous Transfer Mode products for delivery by early 1995 that will bring ATM connectivity to branch locations at speeds down to 56K bit/sec.

In an interview with *Network World* at GDC's headquarters here, Jonathan Reeves, director of ATM planning, described how GDC proposed to the ATM Forum in July how to optimize the current ATM Data Exchange Interface (DXI) for low-speed links.

Used in place of the ATM User-to-Network Interface, DXI is a frame-based protocol almost identical to frame relay that was developed as a simple and inexpensive way to interface routers and other non-ATM legacy equipment to ATM nets.

GDC proposes to optimize the DXI for low-speed access by limiting the maximum allowed frame size. The DXI allows frames as long as 9,000 bytes, Reeves said, while GDC recommends frames no longer than 2,000 bytes.

"This reduces buffering requirements

and would improve the service at low speeds," Reeves said.

GDC would also add other features now lacking in the DXI, such as an equivalent to frame relays' committed information rate and traffic policing mechanisms.

Easy access

GDC's TMS3000 multiplexer (formerly Megamux) uses an adjunct packet processor to support frame relay; the company may also add an ATM DXI access interface.

Frame relay is already accepted as a low-speed feeder to ATM networks, Reeves pointed out, which should engender support for a low-speed DXI. Reeves said that GDC's approach is not much different than that already taken for low-speed Switched Multimegabit Data Service, which uses nearly the same type of DXI.

Reeves said the DXI holds two key advantages over frame relay: It uses the same signaling specification as ATM, and it also shares the same protocol encapsulation schemes as ATM.

Frame relay requires signal translation and other interworking mechanisms that the DXI would avoid. As ATM switched virtual circuits are deployed, this transparent interoperability will prove crucial and could make frame relay a less desirable access alternative, Reeves said.

"We could see ATM explode out to small sites with this form of access," Reeves said. "It calls frame relay into question. We will build both [types of interfaces] but expect they will merge over time."

Since it is frame-based, the DXI encounters the same voice and video limitations that frame relay faces today. It does not offer the same service qualities as cell-based ATM.

USER REACTION

User enthusiasm for GDC's DXI access is limited to scenarios that simply promote a common protocol across the network.

"DXI is certainly a cheap and easy route to the ATM world," said Coyne Gibson, MIS manager at Convex Computer Corp. in Richardson, Texas. "But aside from the convenience of a unified access protocol, it's not of much value to me."

"ATM just isn't very attractive at speeds below [1.5M bit/sec] T-1," Gibson continued. "It's not ATM anymore."

Experts agreed.

"There's nothing wrong with extending ATM out to sites that can't justify the cost of ATM service; but just be aware that the benefits of ATM cannot be gained through the DXI," said Tom Nolle, president of CIMI Corp. in Voorhees, N.J.

"DXI may be a good accommodation for those small sites," Nolle said. "But anyone who thinks you can achieve multiple class-of-service guarantees, as you would with cell relay, is smoking dope."

©GDC: (203) 574-1118.

AT&T steps up attack on phone fraud

BY JOANIE WEXLER

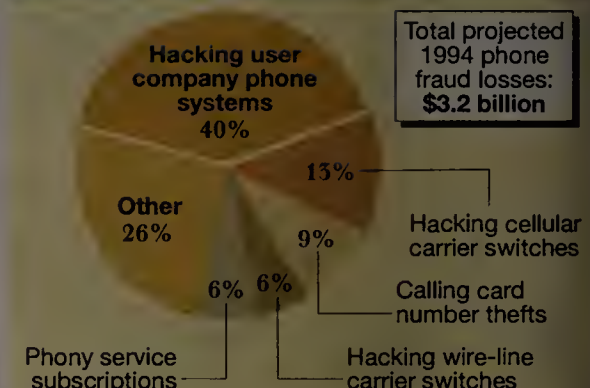
Basking Ridge, N.J.

AT&T and others are getting tough about thwarting thievery of long-distance calls — a practice that costs users more than \$1 billion each year.

AT&T's private branch exchange business unit said last week that it has formed an official investigative team to work with customers and law enforcement officials to flag hackers when they enter a system before hackers can steal any services.

The plan is for AT&T and users of its Definity PBXs
See Phone fraud, page 60

Where fraud will strike



SOURCE: TELECOMMUNICATIONS ADVISORS, INC., PORTLAND, ORE.

MCI

Continued from page 4

asynchronous-to-host protocol conversion and monthly traffic reports — into a single, average usage charge of 8 cents a minute, or \$4.80 per hour.

That per-minute flat rate could go as low as 5.8 cents, depending on the number of user sites as well as volume and term discounts, said Frank Cabri, Xstream product manager. No time-of-day discounts will apply.

In addition, users will gain the option of connecting from the MCI packet net to their hosts at 256K bit/sec; host access has until now topped out at 56K bit/sec.

MCI will provide the dedicated local connection from the user's host to its net at no charge for most customers. Traditionally, these fees have been about \$2,000 per month for a 56K bit/sec line.

A host interface from MCI's network to the user's host will also be included; it typically costs between \$300 and \$1,000 a month.

Installation fees will be waived with Xstream, and 9.6K to 56K bit/sec backup will be included. Onetime installation fees for X.25 have traditionally run between \$2,000 and \$3,000 per host.

Xstream would allow users to basically pay by the drink for time on the network, observed Christine Heckart, senior consultant at TeleChoice, Inc. in Verona, N.J., who called the move "aggressive." Up-front service commitments will be limited to a per-

month minimum aggregate number of usage minutes and a six-month term commitment, MCI said.

Heckart said that at 56K bit/sec, "from a price standpoint, there would be no reason to use frame relay from remote sites" because there would be no price/performance crossover.

Joe Noel, general manager of telecommunications research at IntelliQuest, Inc., a consultancy in Austin, Texas, said the Xstream packages should ease user billing concerns.

"The biggest thing users complained about with BT's X.25 service was billing — that it was complex, inaccurate and delayed," he said.

Xstream customers will also have the option of choosing an 800 dial-up service instead of multiple local telephone numbers for user access, although that option would run users an average of 10 cents per minute more.

But some users will find reasons not to take MCI up on the deal. Meiko Scientific Corp., for example, runs advanced software such as Sun Microsystems, Inc.'s Solaris operating system, whose drivers no longer include older interfaces such as X.25, said Michael Stok, networking and communications manager at the Concord, Mass., software development firm.

He said his company has near-continuous net usage and is turning to 64K bit/sec leased lines between sites MCI has provided for "about 4 cents a minute, no matter how much [of the bandwidth] we use." □

Comments?

See "Contacts" box on page 2.

Bank

Continued from page 1

A key to Chase's move to the MPP system has been its use of Navigation Server, software designed to let users coordinate access to multiple databases on MPP systems.

MPP machines generally have 64 to 1,000 processors that share resources such as a hard disk and power supply.

Support for MPP machines and symmetric multiprocessing machines, which typically have two to 16 processors, is key to database companies since these machines enable extremely large databases to be downsized from mainframe systems.

Navigation Server, a software extension to SQL Server — jointly developed by Sybase and what was formerly called NCR Corp. (now AT&T GIS) — allows a collection of Sybase databases to work together and provides parallel processing of queries against them.

Chase loaded Navigation Server on the MPP machine using a Sybase tool called Configurator to set up appropriate database partitioning schemes.

"I have 64 Sybase databases, but Navigation Server presents it to the user community and developers as if it were one," Landon said. "When a user makes a query, it may go to all 64 servers for information, but users don't know that."

Moving to an MPP machine without a tool such as Navigation Server would have meant going to a proprietary system that would not be accessible from the assortment of front-end query tools Chase plans to use for accessing the data.

"With Navigation Server, we can give different

workers different views to the same data," Landon said.

Prior to the move, some 54 data sources from multiple databases — everything from DB/2 to flat files — resided on an Amdahl mainframe. Users ran 3270 emulation on Windows and Unix workstations over a Systems Network Architecture backbone, and query processing was done exclusively on the host.

With the new system, the 240 end users access information from those same workstations running assorted front-end tools, such as Powersoft Corp.'s PowerBuilder and Business Objects, Inc.'s Business Objects, over a Transmission Control Protocol/Internet Protocol net.

Under this setup, processing is shared between the MPP system and the clients.

Landon considered distributing the database across a network rather than moving it from one large machine to another one but said performance would have suffered.

"You can run it in a distributed environment, but the bandwidth that's needed to do joins across processors is prohibitive at

this point," Landon said.

She added that she can foresee running distributed MPP systems "when the networks are more able to handle the load."

Reports have surfaced that Navigation Server is full of problems, and the product is more than a year overdue, but Landon said she has not had any problems. She attributed the difficulties to people not normalizing data properly and building poor data models.

Still, setting up Navigation Server is no easy task. There are many ways to disperse data between SQL Servers, so there is an element of trial and error in the design phase, she said. □

KEYS to the MOVE

- ✓ Break data into record groups that can be efficiently processed.
- ✓ Stress test your data model before you load your information.
- ✓ Determine how often information is being accessed by decision support system users.



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IBM developing software distribution service

BY BILL BURCH

Washington, D.C.

IBM wants to take the footwork out of software installation with the launch next year of an electronic software distribution service.

The service would enable network managers to download software from manufacturers' servers, then distribute and remotely install it on users' workstations and personal computers.

IBM has been testing a pilot version of the service since March with Sears, Roebuck and Co., its partner in the Advantis

network services venture. That test uses a Transmission Control Protocol/Internet Protocol link to send IBM software from a repository in Boulder, Colo., to a Sears local-area network server in Schaumburg, Ill.

"What we did was connect [the repository] with Advantis, put a front end on it and a few shopping screens" that customers can use to see what is available electronically, said Kathy Howell, IBM's director of worldwide software packaging development.

Distribution on the LAN is handled by IBM's NetView Distribution Manager, which lets net managers remotely install

software on a machine, test it and then restart it. The service will let network managers specify product lists that end users can browse through employing a graphical user interface. Other features will include business system interfaces for automating price quotes and checking order status.

IBM plans to beta-test the distribution systems with outside users for four to six months, to be followed by a service rollout next year. Although the current network uses an IBM server to distribute IBM software, the company is considering tying in other software developers. ■

New software can route calls among multivendor ACDs

BY DAVID ROHDE

Littleton, Mass.

A start-up company today will announce software to let users leverage carriers' intelligent networks to route 800 calls across multiple call centers equipped with different vendors' automatic call distributor (ACD) systems.

The Intelligent CallRouter, from GeoTel Communications Corp. here, will let call center administrators distribute calls among disparate agents as if they were at one site. This could result in more efficient load balancing among agents, allowing companies to use fewer agents and save on toll charges.

Because it provides for links into ACDs from five leading vendors (see graphic), the software will also probably enable users to extend the life of their equipment by another two to three years, said GeoTel President John Thibault.

ACD support

Intelligent CallRouter supports ACDs from the following vendors:

- ◆ Aspect Telecommunications Corp.
- ◆ AT&T
- ◆ Northern Telecom, Inc.
- ◆ Rockwell Switching Systems Division
- ◆ Rolm

Many airlines, retailers and other users have multiple ACD platforms. The market was dominated early on by Rockwell Switching Systems Division, but others such as AT&T and Aspect Telecommunications Corp. have come on strong in recent years.

INTELLIGENT ROUTING

The GeoTel software will also provide several features in advance of the carriers' own intelligent network-based call routing solutions, Thibault said. It will provide for intelligent routing of inquiries initiated not only by a caller dialing an 800 number, but also by an agent, ACD, private branch exchange or voice response unit that has already dealt with one aspect of a customer's inquiry, he said.

The carriers' services only route calls at the time they are originated based on such information as the 800 number dialed, the originating telephone number, and customer routing information stored or accessed at the carrier's signal control point (SCP). SCPs are massive databases that form the guts of the carriers' intelligent nets.

GeoTel's solution should enable call centers to cut down on the number of agents they need and eliminate extra toll charges, said Gary Andresen, principal analyst for Dataquest, Inc., based in San Jose, Calif.

Under the GeoTel solution, the user installs the Intelligent CallRouter software in an Intel Corp. Pentium-based computer at one of the call center sites. A second system can be used for redundancy.

The customer also must purchase direct links into the carrier's intelligent network, a service currently provided by AT&T and Sprint Corp. MCI Communications Corp. is due to make available its customer link into its SCPs in the first quarter of 1995 (NW, Aug. 15, page 4), the same time at which the GeoTel product is scheduled to ship.

To maintain agent status for all the call centers in the network, each ACD or PBX is attached to a peripheral gateway, consisting of software installed in a 486- or Pentium-based personal computer.

The software will cost \$80,000 to \$100,000 per call center. Users will also need to purchase links into their carriers' SCPs; prices of those link vary.

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MS Mail

Continued from page 1

foundation of a public service similar to AT&T Network Notes, being developed by Lotus and AT&T. "Microsoft needs to start priming the pump, getting things out in the channel," said Mike Rothman, an analyst at META Group, Inc. in Reston, Va.

Mesa is just one vendor Microsoft is relying on for Exchange's conferencing capabilities. The others are Collabra Software, Inc. and Trax Softworks, Inc. Conference+ can use Mail as a front end for a bulletin board-like replicating discussion data base.

Bundling Mail and Conference+ will give impatient Microsoft users a taste of integrated mail and conferencing while waiting for Exchange, Rothman said. It is also a way to deliver some of the benefits promised in Exchange. Microsoft has not announced a ship date for Exchange, but estimates of the product's availability have slipped from January 1995 to as late as August 1995.

Merisel, Inc. will sell the mail bundle, according to a marketing manager at the distributor, and several other distributors are

likely to offer it, including Ingram Micro, Inc. and Tech Data, Inc., said David Jones, Collabra's vice president of marketing.

Officials from the other distributors were unavailable for comment.

Microsoft will not comment officially on the deal, although David Perry, product manager for Microsoft Mail and Exchange, said the company is sticking by Collabra, Mesa and Trax as conferencing partners. Mesa could not be reached for comment.

Microsoft is trying to sell the Conference+/Mail package as a groupware starter kit to small and midsize businesses, Collabra's Jones said. It offered the bundling deal to Collabra, which turned it down to focus on larger corporate customers, he added.

"It's the Microsoft way," Rothman said. "Bundle an extra product, cut the price and saturate the market. Microsoft doesn't make money selling new software, they make money from selling upgrades."

It is unclear when the bundle will begin selling.

On the public net front, Microsoft is working on an Exchange version of public groupware offerings under development from rivals Lotus and Novell, Inc. Microsoft

is trying to counter Lotus' early lead by signing up as many carriers as possible.

Todd Warren, group product manager for business systems division marketing at Microsoft, said the company would roll out a service with one or more carriers around the time it delivers Exchange. No deals have been finalized, but Warren said Microsoft is negotiating with AT&T, MCI Communications Corp. and Sprint Corp., as well as carriers in Europe and Australia.

"Lotus got a step up on Microsoft through its deal with AT&T, as did Novell, and Microsoft can't afford to be shut out of the public infrastructure business," said Jim Harrison, a vice president at the META Group consultancy.

The first version of Exchange to hit the public nets may not be full-functioned but will include forms management and routing, electronic mail, and, probably, conferencing and group scheduling, said Microsoft's Perry.

The carriers would not confirm or deny the talks.

◆ Senior Editor Joanie Wexler contributed to this story.



CyberSpeak: Voices from the reader network

Reports have surfaced recently saying the number of Internet users is closer to two million than the 20 million often cited. What do you think?

◆ "Let's conduct a test. From right to left, count off: one..."

John Horton, senior programmer/analyst, Family History Department, Church of Jesus Christ of Latter-day Saints, Salt Lake City

◆ "I agree in part that there are closer to two million regular users on the Internet. I feel that the 20 million figure represents occasional users — those that log on to see what it is like and perhaps surf the net once a week or so. The hard-core users are probably closer to the two million figure. These are the individuals who use it on a regular, if not daily, basis to share reports, mail, information and such. As the benefits of the Internet become more widespread, I think

that 20 million regular users will be in place within a year or two."

Bill Bunch, network specialist, GTECH Corp., West Greenwich, R.I.

◆ "Numbers are always inflated and exaggerated. Similarly, while there may be some 30 million copies of Windows floating around, perhaps 25% at most are actually in significant use. Comparatively, the number of users truly utilizing the Internet, as opposed to occasionally playing around, would be profoundly less than the accepted figure. Everyone is jumping on to ride the Internet. But for most of them, the ride is a short hop instead of a long journey."

Ben Rothke, network manager, Track Data Corp., New York

◆ "This controversy sounds like the decennial U.S. census controversy — 'Did we miscount or did we count 'em correctly?' Three questions, however, immediately occur to me:

"First, what constitutes an Internet user — someone who sends E-mail over the Internet, or someone who uses the Internet for more sophisticated uses such as telnet and ftp?

"Second, how did the people doing the survey come to their conclusions of either two million or 20 million users?

"Third, does the organization doing the counting stand to benefit in some way from an overcount or an undercount?"

Wulf Losee, network analyst, J. Paul Getty Trust, Santa Monica, Calif.

Is Microsoft Corp.'s networking strategy too Windows-centric?

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- ☐ 1 - 500 ☐ 500 - 1,000 ☐ 1,000 - 2,500
☐ 2,500 - 5,000 ☐ 5,000 - 10,000 ☐ Over 10,000

2. What is your role in the purchasing decision?

- ☐ Approve ☐ Evaluate/Recommend
☐ Purchase ☐ Other

3. What is your purchase time frame?

- ☐ 0 - 2 Months ☐ 3 - 6 Months ☐ Longer

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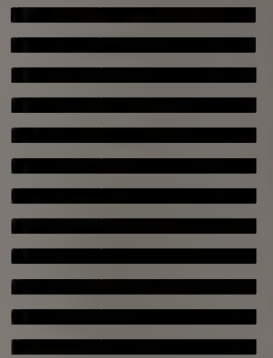
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NETWORKING EQUIPMENT

StrataCom adjunct supports ISDN to frame relay, SVCs

BY MICHAEL CSENGER

San Jose, Calif.

StrataCom, Inc. today will introduce its Intelligent Network Server (INS), an adjunct to its IPX and BPX switches that supports the signaling needed for ISDN access to frame relay, and, later next year, ATM and frame relay switched virtual circuits (SVC).

The INS software runs on a Sun Microsystems, Inc. SPARC 5 workstation linked to an IPX by Ethernet. When a user initiates a call, the setup request is forwarded from the network entry node to the INS, which processes the request and communicates the call setup parameters to other switches across the net.

Multiple INS nodes can be distributed across the network. This provides scalability as nets grow, said Andrew Greenfield, StrataCom's Asynchronous Transfer Mode and frame relay product-line manager.

StrataCom chose this distributed, adjunct architecture for two reasons. For one, "there's more bang for the buck," Greenfield said, explaining that a SPARC 5 with INS software costs less than a dedicated controller card for each switch in the network.

And two, the INS will support programming interfaces that let users develop customized net services, requiring an open Unix-based platform.

The INS will enter beta trials with several carriers during the fourth quarter and will be available in the second quarter next year. It will first support Integrated Services Digital Network access to frame relay nets and then support ATM and frame relay SVCs during the latter half of 1995 as standards are finalized.

For ISDN dial-up access to frame relay networks, users and carriers would need to install an ISDN Primary Rate Interface card on an IPX.

In use, customers with frame relay support on their ISDN Basic Rate Interface equipment place a call into an IPX, which hands off the request to the INS. The INS then searches its database for profiles — compiled originally by the network administrator — of the users' permanent virtual circuits (PVC) to various net addresses.

ISDN calls will be supported on just one 64K bit/sec B channel. StrataCom has not yet decided to provide the inverse multiplexing that would support two B channels or Nx64

multirate ISDN.

Tom Nolle, president of CIMI Corp. in Voorhees, N.J., said 90% of all frame relay circuits are now 56K or 64K bit/sec anyway, so a single B channel satisfies most users.

StrataCom's ISDN support is uniquely suited to dial backup or disaster recovery, said Christine Heckart, senior consultant at Tele-

Choice, Inc. in Verona, N.J.

Heckart said users have long complained that their frame relay PVCs are tied to a particular port on a particular switch. If that switch fails or if the local loop connection to the port goes down, the network must be manually reconfigured.

"Your routers all reference those PVCs, and they would have to be reconfigured for a new frame relay port," Heckart said. The only solution has been point-to-point dial backup lines.

But INS intelligence will recognize a user calling from a different port and will automatically map all PVCs to that new port, Heckart

said. "You don't have to do anything to the router," and the user retains fully meshed connectivity while the failed link is being restored.

Carriers planning to trail the INS include AT&T, CompuServe, Inc. and Wiltel. Vendors who have committed to supporting frame relay ISDN with StrataCom include Cisco Systems, Inc., Combinet, Inc., Shiva Corp., SynOptics Communications, Inc., 3Com Corp. and Wellfleet Communications, Inc.

The INS software will cost \$15,000 per server, not including the cost of a workstation to run it.

©StrataCom: (408) 294-7600.

Reality Check

Product: Intelligent Network Server
Company: StrataCom, Inc.

The benefits:

- Has scalable wide-area signaling intelligence.
- Supports ISDN dial-up access to frame relay.
- Will support ATM and frame relay switched virtual circuits (SVC).

The drawbacks:

- Has ISDN support for only one B channel per user.
- Ease of programming interface is uncertain.
- Call setup delay is uncertain.

The consultant view:

"StrataCom has managed to create something halfway between a permanent virtual circuit and an SVC; it starts to bring the flexibility of virtual LAN networking to the wide area."

Christine Heckart,
Senior consultant,
TeleChoice, Inc.



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ACQUISITIONS

IBM snares Transarc to gain transaction processing edge

BY BARB COLE

Somers, N.Y.

IBM last week said it will acquire Transarc Corp., a vendor of file-sharing and transaction processing (TP) monitor software for an undisclosed sum.

The move is likely to result in a super monitor that combines IBM's CICS TP monitor with Transarc's Encina offerings, and could result in a wider market acceptance of TP technology, analysts said.

IBM already owned a majority share in

Transarc, based in Pittsburgh.

IBM's CICS TP monitors run on most IBM operating systems, including VMS, AIX, OS/400 and OS/2. Encina runs on a variety of Unix platforms and gives IBM access to Transarc's Distributed File System, based on the Open Software Foundation, Inc.'s Distributed Computing Environment.

"This should counteract the lackluster acceptance of both Encina and CICS within the [Unix] user community by adding some much-needed gloss to the product sets," said John Johnson, chairman of The Standish Group, a research firm in Dennis, Mass.

Transaction team

IBM (transaction processing business):

- Is centered around CICS TP monitor.
- Has limited language extensions for developers.

Transarc:

- Is developing a large-scale file system based on IBM-sponsored research.
- Is creating Distributed File System based on the Open Software Foundation, Inc.'s Distributed Computing Environment.
- Is offering the Encina family of on-line transaction processing products.

TP monitors manage the transfer of data between multiple local and remote terminals and the applications that serve them. They are widely used in the mainframe environment but have yet to gain acceptance in the Unix market since few companies have downsized applications with high transaction volumes to these platforms.

Analysts said the acquisition is a good move for IBM, which needs strong TP monitor technology to encourage users that are downsizing from IBM hosts to move to IBM client/server systems.

IBM said it would continue to market both Encina and CICS for at least the near term.

Analysts said Transarc overestimated the demand for TP monitors in the Unix market and basically needed to be saved.

"There hasn't been a lot of investment in the Encina monitor yet, but we think distributed TP monitors are going to solve some of the problems you see with the backlash against client/server," said Dave Hudson, director of market research services at Standish.

Users said the acquisition would likely result in improved systems management, debugging and monitoring — features seen as strengths in Encina and weak areas in CICS.

"CICS doesn't handle some important areas of distributed computing, and I expect that to be addressed by the merging of the technologies," said Bruce Thomas, a CICS user and director of development at MCI Communications Corp. in Arlington, Va. ■

Object addition

Early next month, a group of vendors led by IBM will present a specification to the Object Management Group (OMG) for linking transaction processing systems with object request brokers (ORB).

The application program interface (API) specification will be pitched at an OMG meeting in Dublin, Ireland, said Chris Stone, president of OMG. The group has defined a distributed object computing specification set, called the Common Object Request Broker Architecture (CORBA), for tying together ORBs, software that handles communications between objects across a network.

The new API will be for an object server accessible from CORBA's interface description language, Stone said. The API was developed by Digital Equipment Corp., Hewlett-Packard Co., IBM, Novell, Inc., Oracle Corp., Sun Microsystems, Inc., Tandem Computers, Inc. and Transarc Corp.

BY BARB COLE

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1 Industry: (check one only)

- | | |
|--|--|
| 01 ☐ Manufacturers (other) | 12. ☐ Government Federal/State/Local |
| 02 ☐ Finance/Banking | 13 ☐ Military |
| 03 ☐ Insurance/Real Estate/Legal | 14 ☐ Aerospace |
| 04 ☐ Healthcare Services | 15. ☐ Consultants (Independent) |
| 05 ☐ Hospitality/Entertainment/ Recreation | 16. ☐ Carriers/Interconnects |
| 06 ☐ Media/TV/Cable/Radio/Print | 17. ☐ Manufacturers (Computer/ Communications) |
| 07. ☐ Retail/Wholesale Trade/Business Services | 18. ☐ Systems/Network Integraters (VAR/VAD/
VAN/Systems/Software Houses) |
| 08 ☐ Transportation | 19. ☐ Distributors Communications/ Computers |
| 09 ☐ Utilities | 20. ☐ Other _____ |
| 10 ☐ Education | |
| 11. ☐ Process Industries (Mining/Construction/
Petroleum Refining/ Agriculture/Forestry) | |

2 What is your Job Function? (check one only)

NETWORK IS Management:

- | | |
|---|--|
| 1 ☐ Networking Management | 6. ☐ Corporate Management(CIO,CEO,PRES.VP,
DIR,MGR,Financial Management) |
| 2 ☐ LAN Management | 7. ☐ Consultant (Independent) |
| 3 ☐ Datacom/Telecom Management | 8. ☐ Other _____ |
| 4 ☐ IS,IT,MIS,Systems Management | |
| 5 ☐ Engineering Management | |

3 What is the total number of sites for which you have purchase influence? (check one only)

- | | | | |
|------------------------------------|-------------------------------------|-----------------------------------|----------------------------------|
| 1 ☐ 100+ | 3. ☐ 20 - 49 | 5. ☐ 2 - 9 | 7. ☐ None |
| 2 ☐ 59 - 99 | 4. ☐ 10 - 19 | 6. ☐ 1 | |

4 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. SCOPE (check one only)

1. ☐ Corporatewide
2. ☐ Multienterprise
3 ☐ Departmental
4 ☐ None

B. INVOLVEMENT (check all that apply)

- 1 ☐ Recommend/Specify
2. ☐ Approve
3. ☐ Evaluate
4 ☐ Determine the need
5 ☐ None

5 Check ALL that apply in columns A and B:

- A: I am involved in the purchase of the following products/services.
B: I plan to purchase the following products/services.

A B LOCAL AREA NETWORKS

- 01 ☐ Local Area Networks
02 ☐ Network Operating Systems Software (NOS)
03 ☐ LAN Storage Devices
(optical, tape, disk, etc)
04 ☐ LAN Backup Systems
(optical, tape, disk, etc.)
05. ☐ Network Test Equipment/Diagnostic/
Management Software
06. ☐ Hubs/Intelligent Hubs
07 ☐ Cables, Connectors, Baluns
08 ☐ UPS
09 ☐ Network Adapter Boards/Network Interface
Cards
10. ☐ Peer-to-Peer LANs
11 ☐ Wireless Networks
12 ☐ SNMP Network Management
13. ☐ ATM Switches
14 ☐ Remote LAN Access
15. ☐ Ethernet Switches
16 ☐ LAN Servers
17. ☐ Superservers
18. ☐ Remote Access/Communications Servers

A B REMOTE/WIRELESS COMPUTING

- 19 ☐ Laptops
20 ☐ Notebooks
21 ☐ PDAs
22 ☐ PCMCIA
23 ☐ Mobile Data Services
24 ☐ Wireless Data Services
25 ☐ Wireless Data Equipment

A B INTERNETWORKING

- 26 ☐ Bridges
27 ☐ Routers
28 ☐ Gateways
29 ☐ Bridge/Routers

A B COMPUTERS/PERIPHERALS

- 30 ☐ Micros/PCs
31 ☐ Minis
32 ☐ Mainframes
33. ☐ Workstations
34 ☐ Front-End Processors
35 ☐ Terminals
36. ☐ Printers
37 ☐ Cluster Controllers
38 ☐ Fax Machines
39 ☐ Monitors

A B SOFTWARE/APPLICATIONS

- 40 ☐ Network Management
41. ☐ Systems Management
42. ☐ Micro to Mainframe
43 ☐ Security
44 ☐ Communication/Terminal Emulation
45 ☐ Word Processing
46 ☐ Operating Systems
47. ☐ Client Server Applications Development

A B SOFTWARE/APPLICATIONS (cont'd)

48. ☐ Applications Development
49. ☐ Data Base Management/RDBMS
50. ☐ Spreadsheet
51 ☐ Groupware
52. ☐ EDI
53. ☐ E-Mail
54. ☐ Windows/Graphical User Interface
55. ☐ 4GL Development/Case
56. ☐ Multimedia
57. ☐ Graphics/DTP
58 ☐ Remote Access
59. ☐ Imaging
60. ☐ Suites
61. ☐ Middleware
62. ☐ Document Management

A B WIDE AREA NETWORKS EQUIPMENT & SERVICES

63. ☐ Modems (9.6K bps and over)
64 ☐ Modems (under 9.6K bps)
65. ☐ T-1/T-3 Multiplexers
66. ☐ T-1/T-3 Services
67. ☐ Inverse Multiplexers
68. ☐ Fractional T-1
69. ☐ SMDS
70. ☐ ATM (Asynchronous Transfer Mode)
71. ☐ Matrix Switches
72. ☐ Packet Switches
73. ☐ Protocol Converters
74 ☐ Diagnostic/Test Equipment
75. ☐ DSU/CSU
76. ☐ Microwave
77 ☐ Fax Boards/Modems
78 ☐ VSAT
79. ☐ Fiber Optic
80. ☐ Satellite
81. ☐ ISDN
82. ☐ PBXs (over 1000 lines)
83. ☐ PBXs (under 1000 lines)
84 ☐ Automatic Call Distributors
85. ☐ Voice Messaging Systems
86. ☐ Videoconferencing/Teleconferencing
87. ☐ Voice Response/Processing
88. ☐ Dedicated Leased Line
89. ☐ Switched Data
90. ☐ E-Mail/Online Services
91. ☐ Image Processing
92. ☐ 800/900 Services
93 ☐ WATS/MTS
94 ☐ International
95. ☐ Virtual Networks
96. ☐ Frame Relay
97. ☐ Value Added Services
98. ☐ CIT (Computer-Integrated Telephony)

99. ☐ None of the above (1-98)

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6 What is the total number of LANS, Workstations/Nodes: At this Location/ In your Organization?

At This Location:

LANs

- | | | |
|-----------------------------|-------------------|--------------------------|
| 1. ☐ | 5000+ | ☐ |
| 2. ☐ | 1,000 - 4,999 | ☐ |
| 3. ☐ | 100 - 999 | ☐ |
| 4. ☐ | 50 - 99 | ☐ |
| 5. ☐ | 10 - 49 | ☐ |
| 6. ☐ | 9 or less | ☐ |
| 7. ☐ | None of the above | ☐ |

Workstations/
Nodes

Entire Organization:

LANs

- | | | |
|-----------------------------|-------------------|--------------------------|
| 1. ☐ | 5000+ | ☐ |
| 2. ☐ | 1,000 - 4,999 | ☐ |
| 3. ☐ | 100 - 999 | ☐ |
| 4. ☐ | 50 - 99 | ☐ |
| 5. ☐ | 10 - 49 | ☐ |
| 6. ☐ | 9 or less | ☐ |
| 7. ☐ | None of the above | ☐ |

Workstations/
Nodes

7 Which of the following network platforms are currently installed/planned? (check all that apply)

Installed Planned

A B

NETWORK ARCHITECTURES

01. ☐ SNA
02. ☐ DECNET
03. ☐ MAP/TOP
04. ☐ TCP/IP
05. ☐ DCA (Unisys)
06. ☐ X.25
07. ☐ Novell IPX/SPX
08. ☐ APPC/APPN/LU6.2
09. ☐ NETBIOS
10 ☐ OSI
11 ☐ APPLETALK
12 ☐ NSF
13 ☐ XNS
14 ☐ OTHER _____

NETWORK OPERATING SYSTEM

15. ☐ LOCALTALK (APPLETALK)
16 ☐ BANYAN (VINES)
17 ☐ DCA (IRMALAN)
18. ☐ DCA (10-NET)
19. ☐ IBM (LAN SERVER)
20. ☐ IBM (PC LAN PROGRAM)
21. ☐ MICROSOFT (LAN MANAGER)
22. ☐ NOVELL (NETWARE, 2X, 3X, 4X)
23. ☐ PROTEON (PRONET)
24 ☐ 3COM (3+, 3+OPEN)
25. ☐ ARTISOFT (LANTASTIC)
26. ☐ HAYES (LANSTEP)
27. ☐ DEC (PATHWORKS)
28. ☐ WINDOWS NT/ADVANCED SERVER
29. ☐ OTHER _____

Installed Planned

A B

LAN ENVIRONMENT

30. ☐ 4M TOKEN RING
31. ☐ 16M TOKEN RING
32. ☐ ARCNET
33. ☐ ETHERNET
34. ☐ 100 M ETHERNET
35. ☐ STARLAN
36. ☐ FDDI
37. ☐ LOCAL TALK
38. ☐ 10BASE-T
39 ☐ ATM
40. ☐ OTHER _____

COMPUTER OPERATING SYSTEM

41. ☐ DOS
42. ☐ UNIX/XENIX/AIX
43 ☐ OS/2
44. ☐ OS/2.X
45. ☐ IBM MVS
46. ☐ IBM VM
47. ☐ DIGITAL VMS
48. ☐ MACINTOSH
49. ☐ WINDOWS
50. ☐ WINDOWS NT
51 ☐ X WINDOWS
52. ☐ SOLARIS
53. ☐ OTHER _____
54. ☐ NONE OF THE ABOVE (1-53)

8 For which areas outside of the U.S. do you have purchase influence? (check all that apply)

- | | | |
|------------------------------------|---|---|
| 1. ☐ Europe | 3. ☐ South America | 5. ☐ Middle East |
| 2. ☐ Asia | 4. ☐ Australia | 6 ☐ None |

9 Which of the following hardware platforms are installed/planned in your company? (check all that apply)

	Mainframes		Minis			Mainframes		Minis	
	Installed	Planned	Installed	Planned		Installed	Planned	Installed	Planned
01. IBM	☐	☐	☐	☐	06. DATA GENERAL	☐	☐	☐	☐
02. DIGITAL	☐	☐	☐	☐	07. HP	☐	☐	☐	☐
03. AMDAHL	☐	☐	☐	☐	08. TANDEM	☐	☐	☐	☐
04. AT&T	☐	☐	☐	☐	09. UNISYS	☐	☐	☐	☐
05. BULL HNIS	☐	☐	☐	☐	10. OTHER _____	☐	☐	☐	☐

Which of the following do you have installed/planned: (USE NUMBERS ONLY)

	At This Location		Entire Organization	
	Servers	Clients/Nodes	Servers	Clients/Nodes
11. POWER MACINTOSH				
12. MACINTOSH OTHER				
13. POWER PC BASED				
14. PENTIUM BASED				
15. 80486 BASED				
16. 80386 BASED				
17. 80286 BASED				
18. 80806/80808 BASED				
19. ALPHA BASED				
20. RISC/UNIX BASED WORKSTATIONS				
21. OTHER				

10 What is the estimated value of networking equipment and services that you help specify, recommend or approve annually? (check one only)

- | | | |
|---|--|--|
| 01. ☐ \$100 million and over | 05 ☐ \$10 - \$19.9 million | 09 ☐ \$499,999 or less |
| 02. ☐ \$50 - \$99.9 million | 06. ☐ \$5 - \$9.9 million | 10. ☐ NONE OF THE ABOVE |
| 03. ☐ \$25 - \$49.9 million | 07. ☐ \$1 - \$4.9 million | |
| 04. ☐ \$20 - \$24.9 million | 08. ☐ \$500,000 - \$999,999 | |

11 Estimated gross annual revenues of your entire company/institution: (check one only)

- | | | |
|---|---|---|
| 1. ☐ Over \$10 billion | 4 ☐ \$100 to \$499.9 million | 7 ☐ \$5 to \$9.9 million |
| 2. ☐ \$1 to \$9.9 billion | 5. ☐ \$50 to \$99.9 million | 8. ☐ \$4.9 million or less |
| 3. ☐ \$500 to \$99.9 million | 6. ☐ \$10 to \$49.9 million | 9. ☐ NONE OF THE ABOVE |

12 Estimated number of employees for your entire corporation: (check one only)

- | | | |
|--|---|---|
| 1. ☐ Over 10,000 | 3. ☐ 2,500 - 4,999 | 5. ☐ 500 - 999 |
| 2 ☐ 5,000 - 9,999 | 4 ☐ 1,000 - 2,499 | 6. ☐ 499 or less |

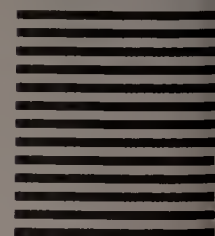
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FIBER OPTICS

Astarte unveils switch for ATM, FDDI, LAN links

BY ELLEN MESSMER

Boulder, Colo.

Astarte Fiber Networks, Inc. has begun shipping the Star-Switch 7200, a fiber-optic matrix switch that can manage fiber-based ATM, FDDI, workgroup LAN and mainframe connections.

The Star-Switch 7200 provides a maximum of 72 input and 72 output ports linking fiber-based local-area networks to Asynchronous Transfer Mode or Fiber Distributed Data Interface backbones. The University of Washington and the Naval Undersea Warfare Center are among the first customers planning to make use of the 7200 matrix switch in their campus backbone networks.

Like the Star-Switch 1600, which has 16 input and 16 output fiber ports, the Star-Switch 7200 works photonically, meaning it switches light signals directly. That obviates the need for converting data packets into optical signals and vice versa, said Kenneth Garrett, Astarte vice president of sales and marketing. Photonic switching minimizes distortion of transmission signals and improves throughput rates.

"The higher bandwidth is definitely an advantage in photonic switches," confirmed Frank Dzubek, president of Washington, D.C.-

based consultancy Communications Network Architects, Inc.

Dzubek noted that the Star-Switch 7200, basically a photonic cross-bar device, is likely to find wider use in large organizations rather than small ones. "Only the big users will need this, because they have more fiber installed and more complex net environments," he said.

The Naval Undersea Warfare Center in New London, Conn., will use five of the Astarte Star-Switch 7200 switches to connect and reconfigure multiple workgroup LANs, Garrett said.

The 7200 is also useful in data center disaster recovery. At BellSouth Corp.'s telecommunications services, the firm's internal services division, the earlier model Star-Switch 1600 has served well in that role.



BellSouth uses the 1600 fiber matrix switch for reconfiguration of pathways between multiple Digital Equipment Corp. VAX computers and an AT&T X.25 DataSwitch.

"When our data center lost power, the fiber switch remembered the connections and brought them back up automatically once power was restored," said Michael Harrington, BellSouth project manager.

"We're looking at using the 7200 in our data center, where we're moving from a VAX mini-computer to an Amdahl [Corp.] mainframe, and we need the higher switching capacity," Harrington said.

With its built-in Simple Network Management Protocol agent, Star-Switch 7200 can be controlled through net management systems such as Hewlett-Packard Co.'s HP OpenView.

The base price for Star-Switch 7200 starts at \$25,000, with a \$500 per-port price.

©Astarte: (303) 449-9970.

BRIEFS

Tribe Computer Works recently unveiled a network access server giving remote users **dial-in access** to AppleTalk and Transmission Control Protocol/Internet Protocol nets.

The TribeLink server supports eight ports at speeds up to 57.6K bit/sec and the Point-to-Point Protocol. The server is upgradable to support Novell, Inc.'s Internetwork Packet Exchange (IPX) protocol, and dial-out communications and LAN-to-LAN routing will be available in the fall.

TribeLink will be available next month for \$1,995. The IPX dial-in upgrade costs \$295.

Tribe: (800) 778-7423.

The **Open Software Foundation, Inc.** recently unveiled pricing for Version 1.1 of its **Distributed Computing Environment (DCE)**, which has been drastically reduced to spur widespread adoption of the technology.

Fees for DCE client software have been reduced from \$75 and \$25 to \$2, regardless of volume. The price for an annually paid client license has been slashed from \$500,000 per year per operating system to \$100,000 per year per operating system.

OSF: (617) 621-8700.

Digital Communications Associates, Inc. recently signed a remarketing agreement with **VisiSoft, Inc.** that allows the company to resell VisiSoft's VisiNet software.

VisiNet lets net administrators gather statistics from DCA Remote LAN Node (RLN) remote access servers and receive alerts when potential problems occur.

DCA will market the VisiSoft software as VisiNet SNMP for RLN. It costs \$1,195 and is available now.

DCA: (800) 348-3221.

Cadence Design Systems, Inc.'s Alta Group recently unveiled **bridge and router libraries** for its net simulation and analysis tools that let users design LAN internetworks by simulating devices from 20 vendors.

The libraries include device models from Advanced Computer Communications, Alan-tec Corp., Chipcom Corp., Cisco Systems, Inc., Digital Equipment Corp., Hewlett-Packard Co., IBM, Novell, Inc., Proteon, Inc., 3Com Corp. and Wellfleet Communications, Inc. They are included in Version 2.0 of the Network Modules components of the firm's Block Oriented Network Simulator.

The router and bridge libraries are available now for \$5,000 and \$3,000, respectively.

Cadence: (415) 574-5800.

BellSouth Cellular ships personal communicator

BY ELLEN MESSMER

Atlanta

BellSouth Cellular Corp. last week began shipping the Simon personal communicator, a hand-held device that can handle mobile cellular calling, electronic mail and paging, as well as run MS-DOS-based applications.

Simon, which is designed for such on-the-go workers as real estate, medical or field sales professionals, has gotten good technical marks, but whether this new class of equipment, the personal communicator, can win over business users remains the burning question.



A true road warrior can't be in touch without a cellular phone, a pager and a fax."

Jim Holcomb
Executive vice president
BellSouth Cellular

BellSouth Cellular is touting Simon as the first personal communicator, but some analysts disputed that. "Strictly speaking, it [was] the EO, which was introduced a year ago; but they've gone out of business," said Michael French, director of mobile computing at research firm LINK Resources Corp. in New York.

AT&T closed the EO facilities less than a month ago. According to LINK Resources (see graphic), AT&T sold only 9,000 of the EO units last year, which was too few to continue production.

Simon, the only personal communicator on the market at present, is given a better chance of success than the EO. Simon weighs 1 pound, making it easier to tote around than the 4-pound EO. And it costs \$899, much less than the \$4,000 for the EO.

FAR-REACHING IMPLICATIONS

Analysts testing Simon said its voice, paging and E-mail features work well. However, since BellSouth Cellular will not say until later this year which application developers are supporting the device, how far-reaching a role Simon might play in the corporate network remains a mystery.

Presently, Simon is "a voice-centric device," said Ben Holcomb, executive vice president of BellSouth Cellular. "But there will be third-party developers designing specific applications for business."

But today's simple DOS-based Simon comes with an electronic calendar, appointment scheduler, address book, calculator,

and pen-based notepad and sketchbook.

Simon, designed by IBM for BellSouth Cellular, has two electronic keyboards, the standard keyboard layout and IBM's predictive keyboard, which makes scientific guesses about probable vowel and consonant usage. The 8- by 2.5- by 1.5-inch device can connect to a personal computer via its RS-262 serial connection.

ANALOG CELLULAR

Over analog cellular frequencies, Simon can send and receive E-mail via any cc:Mail gateway supporting remote dial-in. Simon's cellular/fax modem can send and receive data and faxes at 9,600 baud.

Simon has a PCMCIA slot for extended device memory through PCMCIA cards. Simon's built-in numeric pager can receive and store up to nine pages; pushing a button on the Simon lets users acknowledge each page.

Next month, BellSouth Cellular will release a PCMCIA paging card for storing alphanumeric pages and electronic messages on the card if Simon is turned off.

According to Jim Thorpe, vice president of marketing and sales at BellSouth Cellular, Simon will initially only be sold in 190 cities within the BellSouth Cellular operating region, but in about two months, the personal communicator will be marketed throughout the nation. Traditional cellular phone distributors are certain to be outlets for Simon, but large computer retail chains could jump on the Simon bandwagon, as well.

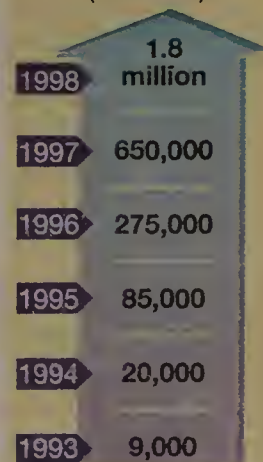
Many business people are bound to find Simon intriguing, according to LINK Resource's French. But he added that Simon poses a big gamble in the marketplace since the \$899 device will be competing in part with cellular phones — some of which sell for as low as \$20.

Analysts also noted that many large companies, including several Japanese suppliers, have personal communicators on the drawing board that are expected to be unveiled by year end. These could offer users more choices and cost reductions.

©BellSouth Cellular: (800) 746-6672.

Ramping up

Sales of personal communicators (units sold)



SOURCE: LINK RESOURCES, NEW YORK
GRAPHIC BY TERRI MITCHELL

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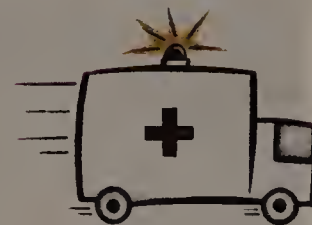


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and NetView/6000.*



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warnings automatically.*



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the System Information Tool
and by System Profile Service
in a DB2/2™ database.*

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by Scott Bradner

Will someone please buy them a clue?

The best — if that is the right concept — places to see the interplay between the populations of this new metaland we call the Internet are some of the mailing lists. And one of the more diverse of these mailing lists is com-priv.

Established many years ago as a forum for discussing the commercialization and privati-

zation of the Internet, com-priv has developed into a forum for more general discussion.

A feature of open, and some closed, mailing lists is cascading stupidity. Someone makes a dumb statement, and a bunch of people try to prove they are dumber than the original poster.

A recent case of this on com-priv was when someone referred to George Orwell's 1994. When it was pointed out that the actual title is 1984, a number of people posted ringing and unequivocal support for 1994 as the title. A perfect demonstration of the type of educational system in which students learn that Iran is somewhere off the coast of England, or was

that New England?

Another recent topic on com-priv was the "change" in the policy of the Commercial Internet Exchange (CIX). The CIX is an industrial trade association that also operates a multiport router where network providers can exchange traffic unencumbered by an appropriate use policy such as that maintained by NSFNET.

The contract a network service provider signs with the CIX states that only providers that are CIX members can exchange traffic across the CIX. This means, for example, that NEARNET must be a CIX member to pass traffic through the CIX even though NEARNET is connected to the CIX through ANSNET.

The fact that ANSNET is a CIX member does not give its customers that are network providers the right of access to the CIX. This clause has been in the CIX agreement from the beginning, and the CIX board recently decided to ensure compliance with the clause by filtering out traffic from non-CIX members.

This caused a fire storm of complaints on com-priv. Many of the smaller providers saw this as some form of extortion, and a few called for an investigation of the CIX. I don't know who would do the investigating since the CIX rules are normal business practices and many of the regional networks have similar rules.

It would seem a bit hard to convince people to join a club for \$10,000 per year each if they could piggyback on someone else's membership for a lower cost. It would also be rather bad business acumen on the part of the club to allow that process since, logically, there would wind up being just one club member, with everyone else going along for cheap. The club would quickly go out of business.

A fee structure of \$10,000 per year is a bit steep for small providers, but it is a lot cheaper than any other method of getting close-to-global connectivity. The CIX has been very successful, with membership growing rapidly, so I hope the fee will go down since the cost of running the exchange is spread over a larger membership.

But it's been quite amazing to monitor the discussion on this, and other topics, on com-priv. The level of understanding of the business world is astonishing, in all senses of that word. The dialogue — well, the exchange of messages anyway — may be the best showcase of the forces that will shape the global village that communication is bringing us. But it sure would be nice if there was a way to do a clue implant on some of the participants.

To join com-priv, send a message to com-priv-request@psi.com. Please do not forget the -request. If you do, thousands of current subscribers will see that you can't read simple instructions and more than a few will describe the correct procedure to you, with one level of explicitness or another.

Disclaimer: Harvard never reads mailing lists so it would not have any opinions on these topics.

♦ Bradner is a consultant with Harvard University's Office of Information Technology. He can be reached via the Internet at sob@harvard.edu.

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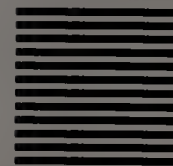


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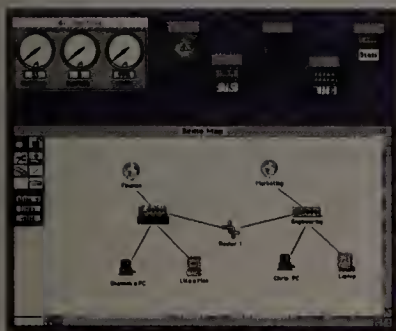
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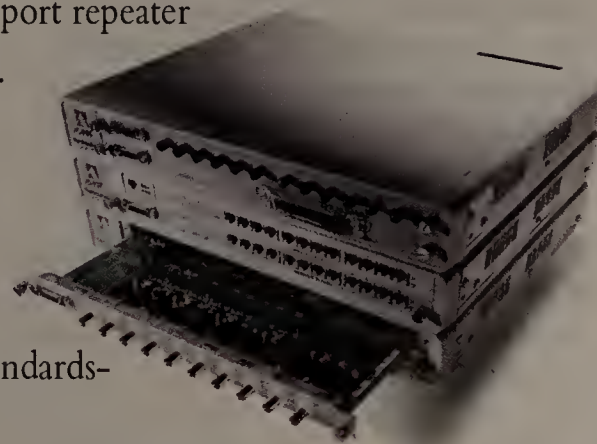
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Asset tracking	X	X	X	
PC tattooing	X	X	X	
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Desktop Management Interface (DMI) ³	X	X		

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Gauging ATM product compatibility: Part II

The second of two articles.

BY THOMAS NOLLE

While the impact of Asynchronous Transfer Mode is only beginning to be felt in corporate networks, a wide array of vendors have committed to developing ATM products — switches, adapters, wide-area services and more.

As these ATM offerings wend their way from drawing boards to the loading dock, interoperability becomes an increasingly important concern among buyers. To help you understand the key compatibility issues, we've developed the ATM Interoperability Report, a quarterly update on the network industry's progress toward providing ATM products and services that actually work together.

The report is designed to spotlight buyer concerns and encourage suppliers to make interoperability — not proprietary hooks — a prime concern in product development.

Last week's initial installment of the ATM Interoperability Report examined the state of affairs in three key areas: user interface standards (Status: 4); switch and carrier interworking standards (Status: 3); and adaptation-layer standards (Status: 2). (See graphic on this page for status index; see graphic on page 34 for category definitions.)

This week, the report examines progress in three additional areas of product compatibility: quality of service definitions; signaling; and application services and APIs.

Quality of service

Status: 1

Quality of service (QoS) definition and assurance is intended to provide a way for users to communicate traffic requirements — their profile — to the network, and ensure the network can meet those needs under normal operating conditions. Without agreement on what's expected and a way of guaranteeing that the network can deliver, ATM services could lose credibility in the market.

The ATM Forum and the international standards bodies have made progress in defining how users specify service levels and in regulating the user's information flow into the network. The "dual leaky bucket" approach adopted in the forum User/Network Interface (UNI) Version 3.0 is an example of that.

But how an ATM network will prevent congestion, reduce delay and minimize discarding of cells is likely to be a complex issue for some time. Most switch vendors have developed buffer management and prioritization strategies to ensure QoS. Since these practices apply within a switch, they are not an interoperability concern.

The question is, Can the practices stay within the switch? At least one ATM switch vendor, StrataCom Corp., has developed a so-called feedback traffic and congestion management system that requires status information to be exchanged among switches in an

ATM network.

This would either prevent interoperation of switches from other vendors or require a change in the Private Network-to-Network Interface to standardize the format of status messages.

The forum is discussing QoS issues, and if proposals for QoS assurance involve switch-to-switch or network-to-user cooperation, standards will be developed.

StrataCom officials have indicated that the need for switch-to-switch cooperation in congestion management is greatest at the relatively low trunk speeds likely to be found in early ATM networks. If they're right, this will be a very important area to watch.

Signaling

Status: 3

Signaling is the glue that holds ATM networks together, passing requests for connection and status information between network elements, and between the network and its users.

Today, most of the signaling attention is being focused on the user/network area to support the critical early work being done by hub vendors, which rely on switched virtual circuits (SVC), and carriers that use the Interim Local Management Interface (ILMI) to report on the status of permanent virtual circuits (PVC).

At the SVC level, the standards situation looks good. The international standard for SVCs, Q.2931, is stable in all major feature areas, and most vendors feel comfortable developing early systems based on it.

For example, this standard is the basis for the SVC support provided in ATM hubs already being sold.

The ATM Forum has refined some of the details of the SVC interface in UNI Version 3.0, and further enhancements are expected in Version 3.1. Most of these changes will not affect the basic services being considered for early ATM local network applications and shouldn't be a concern for users.

UNI Version 3.0 also provides a definition for an ILMI and Management Information Base (MIB) for ATM. These provide a way for the ATM network and user equipment to report availability to one another, and a vehicle for delivering ATM status to user and carrier management systems.

In the UNI 3.0 management structure, UNI Management Entities (UME) exist for each user/network interface. These UMEs communicate over a reserved ATM virtual connection using an open management protocol — SNMP is the most common — called the ILMI protocol.

User management platforms can employ a more general management interface, such as an Internet Protocol-based SNMP connection carried over ATM, to access the MIBs of UMEs elsewhere in the network. That's done in the same way SNMP is used to gather management data from routers. This data would form the basis for a user's management of ATM equipment or services.

Interoperability testing of SVCs and ILMI exchanges will be covered by the Protocol Implementation Conformance Statements being developed by the testing working group, but the work is not likely to be completed before 1995.

But because SVCs and ILMI status exchanges have been a part of ATM interoperability demonstrations from early on, lack of formal testing facilities isn't likely to affect prospective ATM users as long as they stay with products and services that connect via the user/network interface.

The next major advance in signaling will come with the release of Version 4.0 of the forum's UNI. It will provide the following enhancements:

- Support for what the working groups describe as call-and-connection standards, where a user makes multiple connections per call for improved efficiency in handling multimedia communications. Each connection supports a different media.

- A special ring or alert message on multimedia calls, so the called party will know the connection will involve video.

- So-called leaf-initiated joins, where an end node in a one-to-many conference connection can initiate joining the connection. In the current UNI, the new member may be added only by the root station that set up the call.

- One-to-many connections in duplex mode, where all parties can both send and receive. The current UNI supports only unidirectional communications, with a root sender and a number of leaf receivers.

- Third-party call initiation for applications in computer-based training and remote video camera control.

While there are many open issues in the signaling area, arising out of the improvements being proposed for Version 4.0 of the UNI, most early ATM users won't need these facilities. Those that do can expect some interoperability challenges into early 1996.

Application services and APIs

Status: 2

From the start, the Service Aspects and Applications working group of the ATM Forum envisioned three phases to its work.

First, current services such as connectionless LANs, circuit-mode service, frame relay and Switched Multimegabit Data Service (SMDS) would have to be supported between two ATM users so ATM could hope to capture traffic from those applications. Early traffic sources are essential in providing carriers with an incentive to offer ATM services.

Second, the features and facilities of ATM itself must be opened to users via an application program interface. Without this, ATM would only be useful for provisioning other kinds of services, not a service in itself.

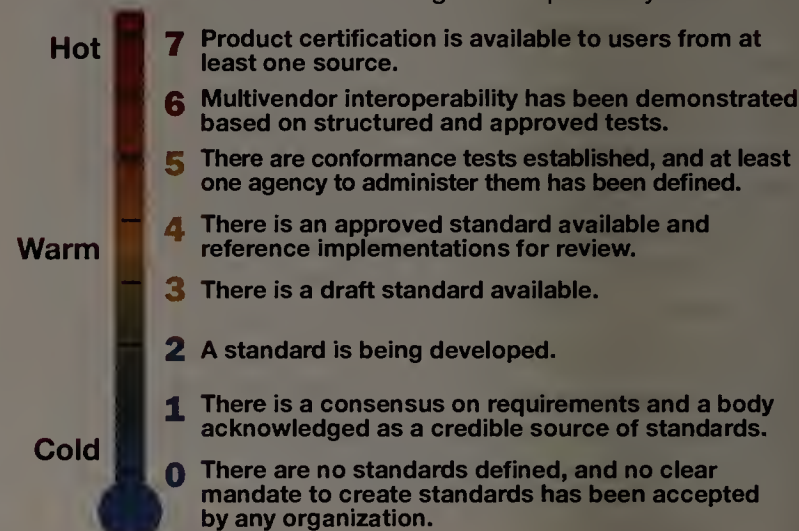
Third, a special service definition for

audiovisual multimedia services must be provided to exploit the special facilities of ATM. Work on this has already been noted in the first part of this series.

The work on providing ATM equivalents to wide-area services such as frame relay and SMDS has been largely completed. Some additional work is needed on how native users of

Status coding

The thermometer index has eight interoperability states.



these earlier services would work with ATM users, but international standards (I.555 for frame relay/ATM, for example) are available to guide the process.

Nearly all ATM switch vendors are addressing — and demonstrating interoperability — based on these requirements today.

For most users, the most important application service to be defined for ATM to date is LAN emulation, an area so active it was spun off into its own working group.

This service will permit ATM-equipped workstations on ATM hubs or switches to communicate with traditional LAN stations or with each other using standard LAN protocols. LAN emulation is at the heart of ATM hubs, and ATM hubs may be the foundation of ATM demand overall.

At a technical level, LAN emulation involves two core functions: an Address Resolution Server (ARS) and a Broadcast and Unknown Server (BUS).

LAN emulation assumes that ATM stations will have virtual circuit connections between them. When an ATM station is running a LAN application that generates a datagram, it will send that datagram on the virtual circuit associated with its destination. In effect, that virtual circuit is a private line to the end station and no other traffic will flow on it.

The problem arises when there is no such circuit set up. To handle this situation, every ATM station running the LAN emulation application has two reserved virtual circuits, one to the ARS and one to the BUS.

To set up a virtual circuit between LAN stations, the sending system must find out the address of the destination. To do this, it makes an address resolution request to the ARS portion of the LAN server, which returns the address. Then the sender sets up the connection.

LAN protocols don't have connection setup today so the application may not wait to begin sending data. To allow some data to flow prior to establishment of the SVC, the BUS portion of the LAN emulation server can accept datagrams to unknown destinations, or multicast datagrams.

The BUS server will then determine where the destination node is and route the datagram

See ATM Report, page 34

multimedia
periphery
routing

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HANDLES
NON-LAN
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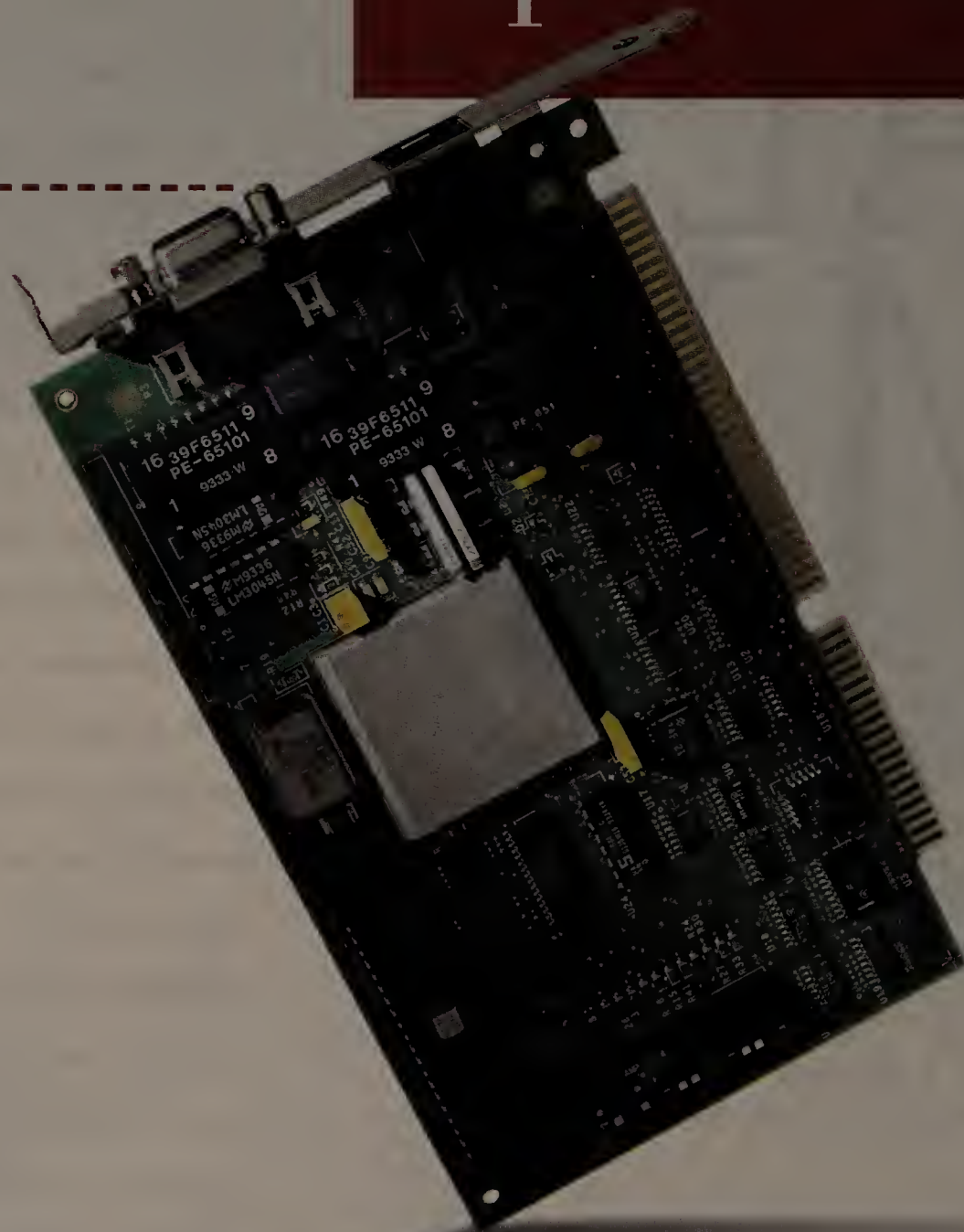
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INSIDE LANWORLD

- Companies wake up to the power of electronic mail-enabled applications. Page L2.
- Bose Corp. puts Scope Communications' LAN analyzer to the test. Page L5.
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- Wiring choices become simpler as LAN options become more complex. Page L11.
- According to columnist Mark Gibbs, some users get downright religious about their networks. Page L14.

Macintosh LANs and the Internet

Using available tools to make connecting a cinch.

BY BILL WOODCOCK

As companies grow more conscious of the benefits the Internet can provide, more and more of them are faced with the task of linking their local-area networks to this global environment.

While that's always been easy for the Unix-dominated academic community, it requires a little more ingenuity to connect LANs running primarily proprietary protocols.

Fortunately for Macintosh users, Apple Computer, Inc. has had a long commitment to supporting the Internet Protocol stack, and Macintoshes are widespread throughout the academic community, where nearly all Internet-related software has been produced to date. As a result, many Macintosh-based tools are available to network managers who wish to take advantage of network services on the Internet.

When people talk of connecting to the Internet, they are generally referring to one of three things: taking advantage of some existing services they can access through the Internet, providing new services to other users via the Internet or using the Internet as a pipe to interconnect several sites at a cost lower than leased lines.

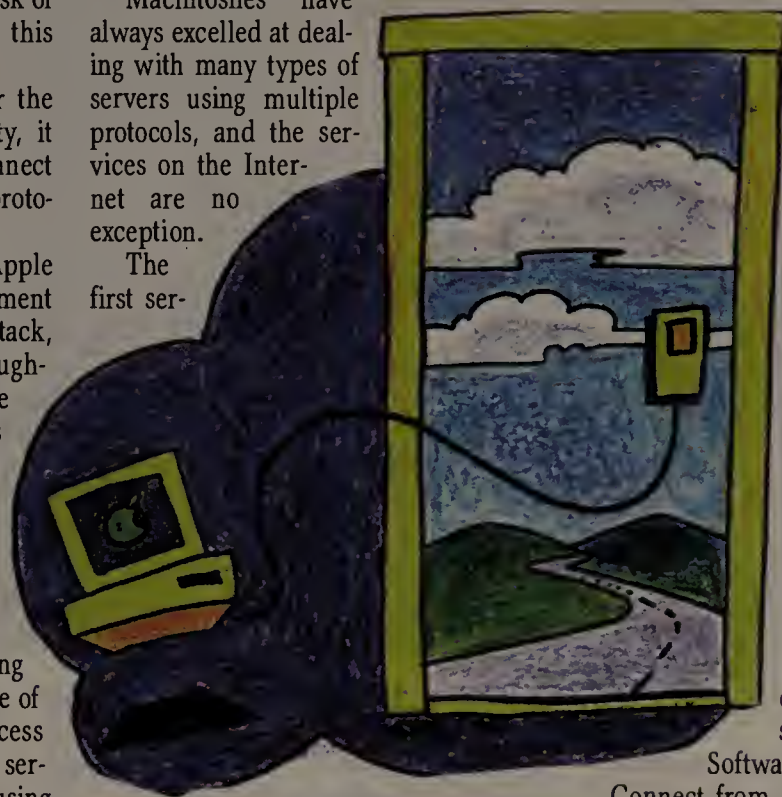
Many companies initially connect with only one goal in mind and discover the others subsequently. These three goals loosely

correspond to the roles of client, server and router.

MAC INTERNET CLIENTS

Macintoshes have always excelled at dealing with many types of servers using multiple protocols, and the services on the Internet are no exception.

The first ser-



vice that comes to mind is electronic mail. The Simple Mail Transfer Protocol (SMTP) is the peer-to-peer E-mail protocol used across the Internet.

In addition, there is a protocol called Post

Office Protocol (POP), which is used between reliable hosts (that is, ones that are connected to the Internet full-time and never powered down) and users who may turn off their personal workstations at night or wish to check their mail from multiple locations.

There are several Macintosh shareware E-mail applications available on the Internet.

Leemail is a very straightforward SMTP peer and POP client, with support for aliases, mailing lists and enclosed files. Eudora

is only a POP client, but it is extremely feature-rich, including not only aliases, mailing lists and enclosed files, but also support for forwarding and AppleScript, as well, which has spawned many AppleScript-dependent "fourth-party" additions.

Iride is a very simple little POP client that supports Multi-purpose Internet Mail Extensions (MIME) for multiple types of content within a single mail message. Aside from these, there are a number of lesser used POP clients, and POP client functionality is built into commercial "all-in-one" client applications such as VersaTerm-Link from Synergy

Software in Reading, Pa., and TCP-Connect from InterCon Systems Corp. in Herndon, Va.

In addition to these IP-native mail applications, there are E-mail gateways that will receive mail on behalf of a user, and then

See Internet, page L15

BRIEFS

Attachmate Corp. last week shipped NetWare 3270 LAN Professional for Windows, a product jointly developed by Attachmate and **Novell, Inc.** The package supports Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX) and Transmission Control Protocol/Internet Protocol optimized for NetWare for SAA, and also provides access to Attachmate tools.

Prices range from \$300 for one unit to \$16,500 for the 64-user pack.

Attachmate: (206) 644-4010.

Two additions to the Rockwell 1200 series of **Fiber Distributed Data Interface** adapters are scheduled to ship this month from **Rockwell Network Systems**, a business unit of Rockwell Telecommunications.

The Rockwell 1265 ISAbus, which costs \$1,295, and 1275 EISAbus, which costs \$1,455, adapters use both single and dual-attach configuration, and comply with ISO and ANSI FDDI specifications.

Rockwell: (805) 968-4262.

VMS-to-Novell interconnectivity software developer **InterConnections, Inc.** this week released PrintSelect, an external **multiprotocol printer**.

The \$629 product gives users of Novell, Inc.'s Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX), Transmission Control Protocol/Internet Protocol, AppleTalk and Digital Equipment Corp.'s Local Area Transport protocols simultaneous access to printers or plotters on an Ethernet network.

InterConnections: (206) 881-5773.

Microdyne Corp. will incorporate **McAfee Associates'** ROMShield **antivirus firmware** into its NE2000plus-3V Ethernet adapter, providing boot-sector virus protection.

The product is scheduled to ship in September priced at \$119.

Microdyne: (703) 730-0500.

Newcomer set to unveil Ethernet-to-ATM products

BY SKIP MACASKILL

Lexington, Mass.

Start-up NiceCom, Inc. this week will unveil a product suite designed to ease the move from shared, packet-based Ethernet networks to switched, cell-based Asynchronous Transfer Mode (ATM) environments.

The rollout will feature a 16-port ATM switch for campus backbone use, a chassis-

based Ethernet-to-ATM departmental switch and a nonchassis version of that device, which can also be configured as an Ethernet local network switch.

"NiceCom offers users a clean-cut way to migrate their shared environments into ATM, and it can differentiate itself from competitors in that it converts everything into ATM cells and distributes the LAN emulation capabilities," said Michael Howard, president of Infonetics Research, Inc., a consultancy in San Jose, Calif.

All three offerings are based on a customized application-specific integrated circuit (ASIC) chip developed by NiceCom, dubbed ZipChip1, which converts packets directly into cells for both Ethernet-to-ATM and Ethernet-to-Ethernet switching at rates up to 780,000 cell/sec.

The ASIC chip, which also performs LAN emulation translation and seg-

mentation, and reassembly functions, combines with an Intel Corp. i960 Reduced Instruction Set Computing processor that handles congestion control and call setup.

The NiCell 200 Ethernet Workgroup Ethernet/ATM Switch offers 12 ports of dedicated Ethernet and an optional ATM interface. So it can act as a workgroup Ethernet switch or gateway for Ethernet users to access servers on ATM nets, ATM public network services and other resources.

The Model 200, which will offer 430M bit/sec of capacity, will support more than 8,000 media access control addresses as well as customizable cut-through and store-and-forward switching schemes. The device will also support the creation of virtual LANs and switched virtual circuits.

The ATM interface will be available as a 155M bit/sec multimode fiber connection that supports Synchronous Optical Network Optical Carrier-3 or as a 45M bit/sec DS3 connection. Single-mode fiber and unshielded twisted-pair interfaces will be available in the future.

The NiCell 1200 Departmental Ethernet/ATM Switch is a chassis-based version of

See Newcomer, page L5

NiCell's software suite supports:

- ◆ Virtual LANs
- ◆ LAN emulation
- ◆ Switched virtual circuit signaling
- ◆ Connection management
- ◆ SNMP management
- ◆ Automatic configuration
- ◆ Spanning Tree Protocol

E-mail as an application infrastructure

BY LINDA MUSTHALER

Companies are beginning to wake up to the power of E-mail enabled applications, recognizing that mail provides a powerful and convenient way to support programs that require data from one source to be forwarded to another application or user.

If you are a Microsoft Corp. Windows user, you might already be familiar with one form of mail-enabled applications. Many Windows applications have a new Mail option in the File menu. Typically, this makes it possible to send a document as an attachment to an E-mail message. You don't even need to leave your primary application to send electronic mail.

But this is only the simplest form of E-mail enabled applications. The real benefit comes when companies implement advanced applications capable of sending and receiving messages and interpreting what to do with them.

Mail at work

Ubiquitous mail systems provide a handy and powerful tool for building applications that do more than simply deliver messages. Applications range from automating the collection of information from branch offices to monitoring something such as a specific stock price and notifying a broker of a significant change.

For instance, users could invoke simple business forms on their personal computers. Having filled out the forms, they send them to a predetermined address. The forms could actually be preprocessors for SQL query statements, which are then sent via the underlying E-mail system to a company database. The database interprets and responds to the queries, then sends the replies back to the users at their PCs.

The uses for E-mail enabled applications are as varied as companies themselves. Applications can be customized to collect pertinent information from branch offices. Or an application could be used to notify someone of a significant event. For example, a stock brokerage could have an application that monitors specific stock prices and notifies the brokers of a significant change.

While the uses of E-mail enabled applications are limited only by one's imagination, the benefits are clear. Any tool that reduces the steps to complete an activity is clearly a productivity enhancer.

End users can accomplish a task without having to search for data or maneuver from one application to another. They can make decisions quicker. Moreover, E-mail enabled applications cut down on the paper chase by reducing document lag or loss. Workflow applications provide for the intelligent routing and transfer of information. And, of course, there is the potential to save both time and money.

Many experts believe that E-mail enabled applications are instrumental to implementing effective workgroup computing. E-mail is the foundation for building groupware applica-

tions. Sending information encapsulated in a message becomes just another menu option — it's as simple as that.

Of course, making it that simple for the end user can be quite complicated. There are four components of an E-mail system that need to be tightly integrated, like the pieces of a jigsaw puzzle.

ASSESSING THE PIECES

The first is the mail client, or user agent, which typically operates on the user workstation. The mail client, which is the user interface portion of the E-mail system, allows the user to create, send and receive mail.

The second component is the message store, or post office, which acts as a repository for undelivered mail. It receives mail and stores it until the mail can be delivered to the appropriate client.

The third component is the message transfer agent, which sorts and routes messages among private mailboxes and post offices on the network.

The fourth component is directory services, which act as the telephone book for users and keeps track of all users, along with their pertinent address information.

All four of these components can be found in commercial local-area network mail packages, such as cc:Mail from Lotus Development Corp. or Microsoft Mail from Microsoft.

There are some products, such as Novell, Inc.'s Message Handling Services (MHS), that operate strictly as a back-end messaging engine for third-party front-end mail clients. E-mail players that write front-end applications for MHS engines include, among others, Da Vinci Systems Corp., Reach Software Corp. and Beyond, Inc. (now part of Banyan Systems, Inc.).

Both custom and commercial applications that are E-mail enabled generally interface directly with the message store component of an E-mail system through an application program interface (API). These applications then act as the user agent, allowing users to send and receive messages from within the application.

SIZING UP APIs

There are several major APIs in the PC-based E-mail arena, the fastest growing E-mail market segment. The leading APIs are: Microsoft's Messaging Application Programming Interface (MAPI); Vendor Independent Messaging (VIM) from Lotus and supported by other industry players; Common Messaging Calls (CMC) from the X.400 API Association; and Novell's Standard Message Format (SMF) for NetWare MHS.

Apple Computer, Inc. also has an E-mail API that comes with its System 7. Called Open Collaborative Environment, Apple's entry is

not as significant a player in the messaging arena.

Which API is best? That depends on your E-mail installed base and the communication and platform requirements of your intended application. If your application is primarily for a small workgroup with a homogeneous network environment, you would use the API recommended by the vendor of your E-mail transport system. For instance, if your offices use cc:Mail or Lotus' Notes exclusively, then the obvious API choice is VIM.

The API decision gets more complicated for applications that span heterogeneous desktop systems and transport protocols. For example, SMF for MHS might be fine for the NetWare-centric users in the enterprise, but what happens when the E-mail message has to cross over to users on your mainframe legacy systems?

The fact is, there isn't an obvious solution today. The E-mail API market is still a vendor battleground, and there is no clear winner yet. But you can study where the market is headed and hedge your bets with the most promising players.

With the R&D and marketing clout of Microsoft behind it, MAPI is a good choice. MAPI actually comes in three flavors: Simple, Extended and Version 1.0.

This three-tier approach provides a level of services and capabilities that span the needs of application programmers, systems programmers and service providers. At the high end of the hierarchy, MAPI 1.0 could eventually become the dominant mail architecture. One drawback of MAPI: It runs only on Windows and Windows NT platforms today.

VIM has the advantage of being designed for any type of client system and will interface with any mail system. It is a Lotus product but has backing from Apple, Borland International, Inc., WordPerfect, Oracle Corp. and MCI Communications Corp.

VIM is losing steam, however, as MAPI and CMC are gaining support. Even Lotus soon will begin supporting both MAPI and CMC in cc:Mail. Moreover, with its "all things to all people" strategy, VIM can be difficult to implement.

CMC is a compromise API that was born of the MAPI vs. VIM war. Supported by both Microsoft and Lotus, among other vendors,

CMC is the common denominator among different E-mail systems.

What's more, it is good for heterogeneous desktops and transports. Designed for simple messaging, CMC enjoys support from many commercial E-mail developers that pledge native support for this API in their products. CMC could emerge as the best compromise solution for enterprise applications.

The last option is not really a procedural API, but a standard file format for NetWare's MHS. While MHS is a strong mail engine with broad front-end support, it is NetWare-centric and does not span the enterprise well.

There are numerous tools on the market to help you develop your E-mail enabled applications, integrating them into the E-mail system to automate time-consuming functions.

Some of the popular development tools include Delrina Corp.'s FormFlow, Reach's WorkMan, Microsoft's Electronic Forms Designer, JetForm Corp.'s JetForm, Isoco's MAPIware; Banyan's BeyondMail Forms Designer and The Malloy Group's Top of Mind Advanced Help Desk.

Of course, there are many others, and new products hit the shelves of this rapidly growing market every day. As you can tell from the names, many tools are associated with creating forms for workflow — frequently a first application for many users.

CASE IN POINT

The Inter-American Development Bank (IDB) in Washington, D.C., for example, has been using Delrina's FormFlow software to automate the more than 470 forms in use at this international finance hub for Latin American and Caribbean countries.

The first application to be developed was a purchase requisition application that integrates with IDB's proprietary E-mail system. The application permits the routing of a form to the appropriate service provider, following proper authorization through electronic signatures. The application also has audit trail capabilities and review/status functionality so that users know the location and status of a purchase request at all times.

According to Project Manager Jorge De Almeida, this and other E-mail-enabled applications at the bank provide for more efficient business processes. The time span needed to route and process forms has been dramatically reduced. Moreover, since the bank no longer has to store paper-based forms, there is tremendous savings in not printing

forms until they are needed and in not warehousing preprinted forms.

One additional benefit of the automated forms project is that the information systems department now enjoys a better image inside the organization for having delivered a cost-effective solution to a companywide problem: How to route information in a timely and secure fashion. As it turns out, E-mail is the only way to go.

◆ Musthaler is vice president of research at Currid & Co., a Houston-based technology consulting firm. She can be reached at (713) 789-5995.

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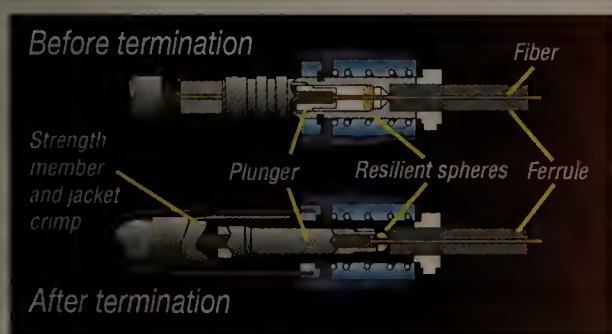
Building mail-enabled applications

Enabling an application to forward data to a remote user or another application requires interfacing the program with the message store component of the underlying mail system through an API.

The leading APIs in the PC-based E-mail arena include:

- ◆ Microsoft's Messaging Application Programming Interface
- ◆ Vendor Independent Messaging from Lotus and supported by other industry players
- ◆ Common Messaging Calls from the X.400 API Association
- ◆ Novell's Standard Message Format for NetWare MHS
- ◆ The E-mail API in Apple's System 7 Macintosh operating system

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May 1993

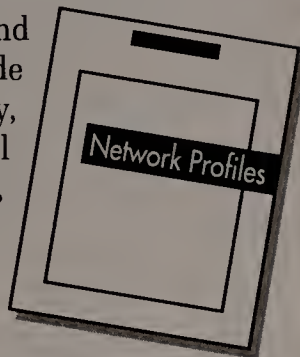
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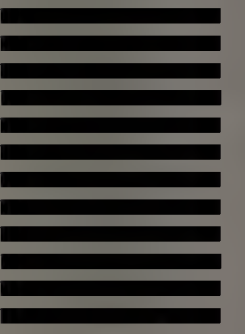
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LAN analyzer keeps the woofers woofing at Bose

BY SKIP MACASKILL

Framingham, Mass.

When it costs about \$1,000 to cover rewiring and infrastructure setup every time you move a user to a new location, you better make sure you get it right the first time.

Such is the advice of Eric Epstein, network manager at Bose Corp. here, who discovered that a hand-held network analyzer was the easiest, fastest and most inexpensive way to confirm and verify network connections after a move, add or change.

"If we move 50 users, we're looking at expenses of \$50,000," he said. "So we need to do it correctly the first time or we'll incur additional costs when forced to redo the move later."

By using a beta version of Scope Communications, Inc.'s FrameScope 802 LAN Data Analyzer, Bose technicians are able to verify moves in minutes.

"In a regional office in Toronto, we moved 40 users to new locations and were able to test and certify each cube's connection in [a total of] 20 minutes," he said.

Bose will be Bose

Bose Corp., which moves about a third of its network users per year, is spread across 25 sites worldwide and supports a network of more than 4,000 desktop computers and terminals.

BOSE

FrameScope is a hand-held analyzer for Ethernet and token-ring environments that helps network managers troubleshoot their networks by attaching it to a network segment and capturing data packets.

Information about those packets can then be displayed on Frame-



Scope's screen and analyzed by the network manager.

Bose has also used FrameScope to perform network tests to isolate potential problem areas. "The time it saves us in troubleshooting has been remarkable," Epstein said. "Technicians can ping a device and immediately discover whether it's a network problem or a PC issue. The analyzer is also very intuitive, so you don't have to be a network expert to use it."

FrameScope is also easy to carry around — it measures 7.5 by 4 by 1.5 inches and weighs 1.3 pounds — a fact

that makes it popular with Bose's technicians.

FrameScope can also provide some functionality not found in other products, such as Network General Corp.'s Sniffer, Epstein noted.

"Another key feature is FrameScope's multitasking capabilities," he said. "I can generate IP, IPX or AppleTalk traffic to test a certain link and check the number of collisions on a particular node at the same time. The Sniffer can't even do that."

FrameScope is available now and costs \$3,995.

©Scope: (508) 393-1236.

Newcomer

Continued from page L1

the 200. The device supports as many as four 200 switch modules, allowing it to handle as many as 48 dedicated Ethernet ports and four ATM connections. A two-port ATM interface module will also be available.

The 1200 provides dual power supplies, hot-swappable modules and room for two ATM core switch modules, which are matrix switches with eight input ports and eight output ports operating at 155M bit/sec each.

The NiCell 2000 Backbone ATM switch is a 16-port device that features a matrix switch with 16 input ports and 16 output ports all operating at 155M bit/sec. The switch can support more than 64,000 virtual connections, provides per-port buffers of more than 300 cells and can be used to link several NiCell switches.

Analysts were generally supportive of NiceCom's approach.

"When you don't have an installed base to protect, you can be real aggressive in your approach — and designing a product line that is ATM to the core is aggressive," said Ron Jefferies, principal at Jefferies Research in Santa Maria, Calif.

The NiCell line will go into beta testing in October and be generally available in January. The 200 will cost \$8,400 (\$7,200 without the ATM interface), while pricing for the fully configured 1200 and 2000 will be \$48,100 and \$39,600, respectively.

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The bumpy road to NetWare 4.0

*Sales are beginning to mount,
but users are still hesitant.*

BY MARY MARTIN

NetWare 4.0's bumpy road has begun to smooth out, but it's no four-lane blacktop yet.

Slow initial acceptance has improved as upgrades and discounts remove some of the reasons customers hesitated to move on down the road with Novell, Inc.

Installations of 4.X are "not of the magnitude we'd like to see, but they're definitely growing," said Ron Rosen, advanced client services manager for Entex Information Services in New York.

"When 4.0 first came out, companies were saying, 'That's interesting, but it's point zero,'" Rosen recalled. "With 4.01, larger corporations began to get into it on a small scale. The reaction I'm getting now is a blinking green light, as opposed to a blinking red or solid yellow."

Rosen thinks the improvements in the recently shipped Version 4.02 are going to help the product fly.

Others do not expect to see the product shift into high gear until the release of 4.1, delayed until December. NetWare 4.X is still weak in the marketplace, according to Jamie Lewis, president of The Burton Group in Salt Lake City. "Most people are still waiting for 4.1," he said.

Resellers report mixed results with the product. Jim Willeke, senior technical consul-

tant for Burkey & Associates in Columbus, Ohio, a Novell platinum reseller, recommends 4.X to his customers and said his firm has installed the products in about 100 networks. He said dealers are often responsible for slow acceptance because they have failed to learn the system themselves.

At GSI, Inc. in St. Louis, another platinum reseller, owner Gary Sudin said 4.X installations have risen from about 10% of NetWare sales a year ago to 50%.

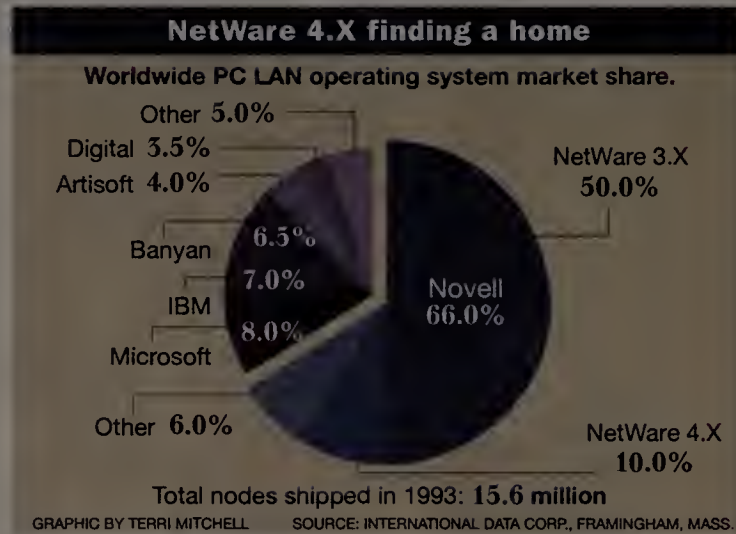
But at gold reseller Microtech Services, Inc. in Woburn, Mass., owner Tom Mandrafino said, "We haven't sold one package. We really haven't seen a need for it, nor have our customers." Mandrafino said his increasingly cost-conscious clients are not convinced that a substantial benefit will result from the investment in 4.X.

But with a steady 66% of the worldwide network operating system market, Novell was bound to make inroads, despite a launch that seemed to sputter.

According to Lee Doyle, director of local area networks and data communications research at International Data Corp. in Framingham, Mass., 4.X shipments have proba-

bly grown from 51,000 in 1993 to between 85,000 and 100,000 currently. In 1993, 4.X represented about 10% of all network systems sold, according to IDC.

Still, 4.X sales have a long way to go before they surpass 3.X revenues, which should come as no surprise, Doyle said. After all, it took two years for 3.X sales to top its predecessor.



Dataquest, Inc. in San Jose, Calif., estimates that NetWare 3.12 is still outselling 4.X by 6-to-1, with sales of 4.X coming in at under \$20 million per quarter, according to principal

analyst Marty Palka. "Novell is used to a slow ramp-up," Palka said. "I think they're probably disappointed but not shocked."

Toby Corey, senior marketing director for NetWare products in Provo, Utah, maintains that 4.X sales have been accelerating but declines to cite numbers. He said there is "no excess inventory" in the sales channel. Corey called the 6-to-1 ratio of 3.X to 4.X sales "pretty close" and added that two to three years is a reasonable target for the ratio to turn around. "We're not too far off that mark," he said. Version 4.0 initially shipped in March 1993.

Meanwhile, Corey said, Novell is taking an aggressive approach to speed the transition.

Discount programs available through July reduced the price of 4.X upgrades by 25%; current reductions are 15%. An additional carrot for customers that upgrade before Oct. 31 is a free copy of GroupWise 4.1 (formerly WordPerfect Office), which carries a \$4,700 retail tag.

Price has been a sore point for NetWare 4.0. Novell said early on that it would not compete in price with Microsoft Corp. on its Windows NT Advanced Server. The recent discounts are not an indication of any change in strategy, Corey said.

"They're not really competing in price with Microsoft, they're just reducing some of the sticker shock," Doyle observed.

Some resellers want Novell to provide more flexible price structures for customers that are not large enough for a master license agree-

See NetWare 4.0, page L15

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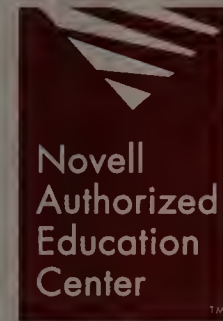
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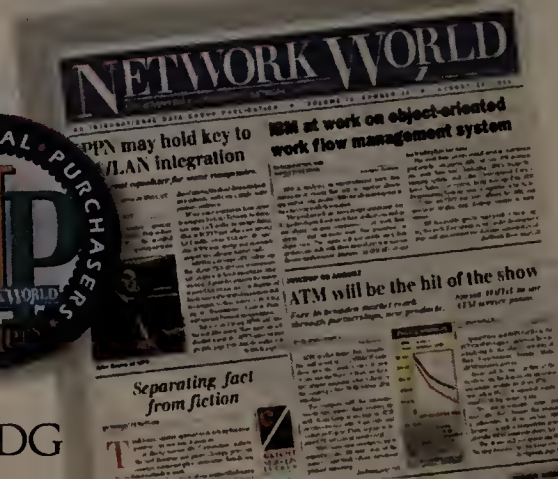
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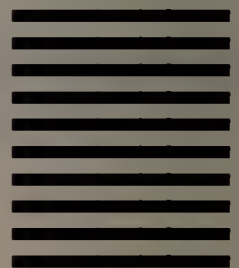
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Will the need for routers vanish in an ATM world?

Pure ATM nets may not need them, but others will.

BY MARTIN TAYLOR

Taylor is vice president of network architecture at Madge Networks, Inc.

In any era of dramatic change, the wisest among us temper the urge to embrace the new with a prudent caution toward wholesale abandonment of the tried-and-tested.

A case in point is the current move toward Asynchronous Transfer Mode (ATM), a truly revolutionary information technology that challenges all our assumptions about what a

VENDOR VIEW network should look like. As we build ATM-based networks to support future applications, how many of today's concepts of internetworking are we going to leave behind?

It is often said that ATM networks don't need routers — but is this true?

Well, yes and no. Those lucky, but rare, network architects who will be building pure ATM networks from scratch can afford the luxury of employing a single, consistent technology model — switched, not routed — from the outset.

For the rest, though, transition to ATM will be a long process in which the interplay of current and emerging technologies will be critical. So it is likely that, in the majority of cases, routing will be a vital function for some time to come, particularly to support wide-area connections.

One of the key differences between ATM and today's local-area network technologies is that ATM is truly scalable, while LANs are not. A single LAN segment is limited in size to a few dozen end stations because bandwidth on the wire is being shared among the network users.

Furthermore, LAN protocols and access methods are designed to operate over limited distances, and a LAN segment cannot be extended beyond a certain maximum physical span.

So LANs are not scalable in terms of capacity or physical size. When you want to build a network that spans physically separate sites, you need devices that hook up the LANs to the lines between the sites, which convert the data transmissions from LAN protocols to long-distance Point-to-Point Protocols.

TECHNOLOGY OF CHOICE

Routers have become universally accepted as the technology of choice for linking LANs across the wide area. Readers familiar with the seven-layer ISO model for network protocols will know that the "correct" way to interconnect network segments with different Data Link layers — such as token ring and the wide-area High-Level Data Link Control protocol — is to use a Network layer relay, otherwise known as a router.

Routers provide a variety of services that are expressly designed to deal with the differences between the various Data Link layers. These include the provision of an overall (Network layer) addressing scheme that is independent of the details of addressing at the Data Link layer and the capability to convert from one Data Link frame format to another.

Routers make decisions about the forwarding of incoming data packets based on Network layer address information in each packet. This information is extracted and analyzed, and compared with routing data tables to determine which port the packet should be for-

warded to. Network layer addresses then have to be resolved into Data Link layer addresses if the packet is to be transmitted onto a shared medium network segment such as Ethernet or token ring.

Carrying out all these tasks on each packet that is received by a router requires a great deal of software and, if performance is to be acceptable in a large and busy network, a great deal of processing power.

Besides handling individual packets, there is another important task routers carry out "off-line," so to speak — the updating of the routing tables that are used to determine where

each packet should be sent.

Routers create and maintain their own routing tables dynamically. This allows the routers to respond automatically to changing network conditions such as overloading and failed links.

Routers, therefore, talk to one another independently of the transfer of data packets among end users to inform one another of the topology and status of the network and to maintain the routing tables that direct data packets along the optimum paths so they can arrive at their final destinations.

See ATM, page L10

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ATM

Continued from page L9

The distinction between the real-time processes of data transfer and the background processes of route determination is an important one, and we shall be referring back to this concept when we look at the implications of ATM switching.

Now suppose we could define a Data Link layer technology that was truly scalable, that could operate over any distance and that provided a growth path for incremental capacity.

With such a technology, we would be able to build a network as large as we liked and use the same Data Link layer throughout. We could meet all our needs with a single network "segment," and, therefore, we would not need any Network layer relay devices.

In fact, we use a network like this every day — the telephone system. This network's "Data Link layer" is analog speech or modem signals. There is no equivalent of routers in the telephone network, but that has not stopped it from growing very large both in terms of numbers of users and in physical size.

The functions of data transfer and route

determination are present in the private branch exchanges and central office switches that make up a telephone network, just as they are in a router-based internetwork.

In a telephone network, data transfer is simple because the same Data Link layer is present throughout. The switch, therefore, only has to move a bit stream from one port to another. Route determination, on the other hand, may be very complex. For example, a PBX may have to decide whether to use a private line or a choice of public-switched services to route a particular call based on the availability of capacity and the relative costs of

the different routes.

One essential difference between router-based internetworks and telephone networks, of course, is that routers generally deal with connectionless data transfer, whereas telephones are connection-oriented.

The complex decisions about how to route a phone call are made when the call is dialed. Once the call is set up, the transfer of data between the ports of the switch is carried out by hardware alone and involves no additional processing power.

In a router, by contrast, software is needed to analyze each packet before data transfer can take place.

BEYOND THE PHONE MODEL

The telephone network model is fine for voice, but of course, it does not meet the needs of bursty, high-bandwidth data transmissions.

ATM is a technology that uses the connection-oriented approach of the telephone network but provides a combination of high-speed and statistical multiplexing that allows it to carry bursty data mixed with continuous video and voice transmission.

A call needs to be set up before data transmission can take place, but data transfer between ports in ATM switches is carried out by hardware alone. No equivalent to a router is needed, as the same Data Link layer is used throughout the network.

The end-to-end delay in an ATM network is orders of magnitude less than in a router-based internetwork, while the capacity of an ATM switch may be as much as 10 to 100 times that of a similarly priced router.

ROUTE DETERMINATION

There is still the issue of route determination. Here, the ATM switches will function somewhat like routers, exchanging information regarding network topology, route availability and transmission cost.

This information is essential to allow the ATM switches to choose the best route for any particular session when end stations initiate a call. And route determination is not just limited to making decisions when calls are set up. ATM switches will also reroute existing calls when links go down, providing the same degree of fault tolerance as routers do today.

There is nothing new in any of the route determination logic needed in ATM switches: PBX vendors have been perfecting these techniques for years.

This means it will be realistic to build large ATM networks that provide a Data Link layer service end-to-end but without a router in sight.

But interconnecting dissimilar Data Link layers isn't the only reason we use routers. What about broadcast traffic? If we have one big network with thousands of clients and servers, won't we be flooded with broadcasts?

Fortunately, broadcasting is not the only way for stations to locate resources on the network. Vendors of network operating systems have realized this and are starting to offer new features that dramatically reduce or even eliminate broadcasting — for example, the NetWare Directory Services that form part of Novell, Inc.'s NetWare 4.X. As network software vendors build ATM awareness into their products, the broadcast issue will become history.

ATM combines the scalability and hardware-based data-transfer efficiency of the telephone network with the high speed of the LAN, and therefore can provide a truly universal Data Link service end-to-end, spanning both local and remote connections. ■



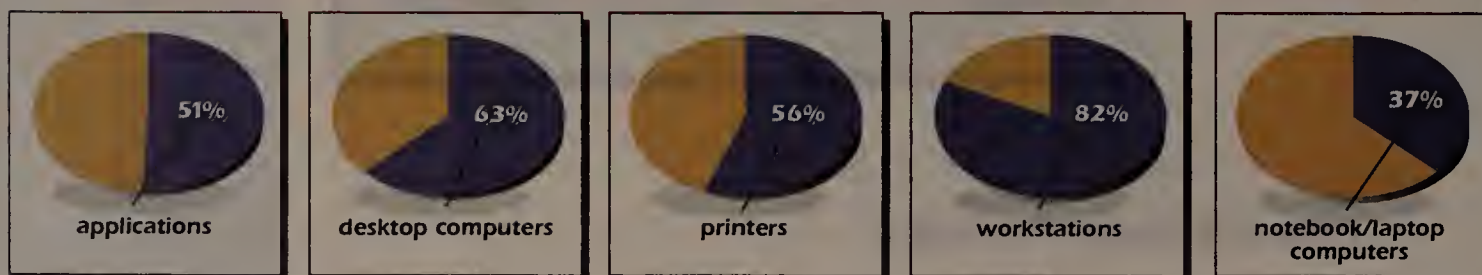
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Wiring decisions: They get simpler as LAN options grow

BY JOANNE CUMMINGS

The advent of technologies such as ATM and 100M bit/sec Ethernet have more than a few people wondering what type of wire to install to accommodate future technologies. Ironically, questions about wire seem to be getting simpler as the range of LAN options grows more complex.

There used to be three options — unshielded twisted pair (UTP), shielded twisted pair (STP) and fiber.

UTP was fine for 10Base-T Ethernet applications; STP, synonymous with the IBM Cabling System, was primarily used at IBM sites; and fiber was used where Fiber Distributed Data Interface's 100M bit/sec speed was needed or planned for future use.

A look at wiring: Categories 3, 4 and 5

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NEXT	53.3	43.3	36.6	NA
Category 5				
Attenuation	2.5	4.5	7.0	24.0
NEXT	60.3	50.6	44.0	27.1

NA = Not applicable

SOURCE: SCOPE COMMUNICATIONS, INC., NORTHBOROUGH, MASS.

But even the prospect of supporting Asynchronous Transfer Mode at 155M bit/sec no longer sends people looking for fiber. Rather, users considering fast local-area network technologies are overwhelmingly choosing to install Category 5 UTP.

"We're moving into a new building with Type 5 wire," said Bob Steiger, director of information systems at CareAmerica, a health maintenance organization in Chatsworth, Calif. "That will support 100M bit/sec if we need it. So we feel we're in the position to grow if the utilization got to the point where it demanded that."

Right now, the HMO is making out fine using its 10Base-T Ethernet to support its imaging applications. "We're looking into [Hewlett-Packard Co.'s] 100Base-VG, but we're really not addressing it yet," Steiger said, adding that the firm's LANs currently run at about 8% utilization.

"We can accommodate the current traffic with 10Base-T," Steiger said. "And by current, I mean the planned traffic for the next couple of years. So when we move, we'll keep what we have but know we can upgrade it if we need to because the wiring will support 100M bit/sec." The company uses fiber in the backbone but considers it overkill at the node level.

CareAmerica is typical of most new installations, according to Mark Myrick, vice president of network media at Anixter, Inc., a cable supplier in Skokie, Ill.

"There's no doubt that most people are installing Category 5 right now," Myrick said. "It's estimated that over 60% of the buildings are going to be wired with Category 5 by 1996."

Today, the installed base is still primarily Category 3. But if you're looking at new installations, Category 5 is dominating everything."

WHY 5?

The wire categories are specified by the Electronic Industries Association/Telecommunications Industry Association 568 Com-

mittee, which has set a number of commercial standards for using unshielded wire to support data networks (see graphic).

Each category or grade of UTP is rated to handle different maximum data transmission speeds.

Category 3, which is typical voice-grade wiring, can support Ethernet's traditional 10M bit/sec.

Category 4 is specified for up to 20M bit/sec and is used primarily for sites interested in running IBM's 16M bit/sec token ring over UTP.

Category 5 can handle 100M bit/sec speeds

today and appears as though it will even meet the requirements of emerging high-speed LANs such as 155M bit/sec ATM (quite an accomplishment, given the industry was once skeptical about the ability to run even 10M bit/sec over UTP).

What sets the three categories apart is their ability to inhibit near-end cross talk (NEXT) and attenuation.

Attenuation is the degree to which a signal loses its strength as it travels down the wire, while cross talk involves one channel interfering with another.

See Wiring, page L12

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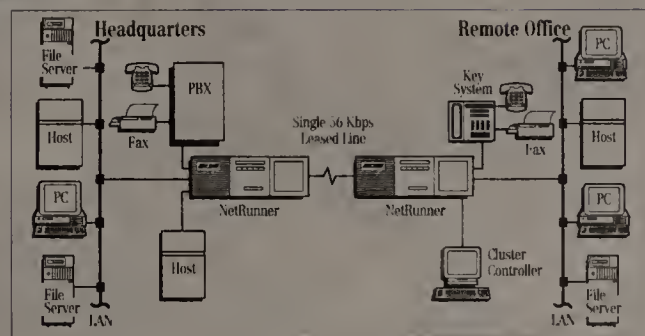


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Wiring

Continued from page L11

"UTP networks use one pair of wires to receive and one to transmit," according to Peter Williams, president of Scope Communications, Inc.

"NEXT is caused by having a transmit signal that is strong and a receive signal that is relatively weak. Because the pairs are together, some of the transmit signal bleeds over to the receive pair, which adds noise to the signal," Williams explained. "If you inhibit that bleed-

ing, then you have a cleaner receive channel. If you don't, you eventually produce so many errors that the network becomes nonfunctional."

Category 5 wiring can handle 100M bit/sec data speeds without producing a high amount of noise, and thus network errors, because it has more twists per inch — and the twists are carefully controlled to ensure that each strand twists when it is supposed to — than lower grade wire.

The material encasing the wire is also of better quality, which inhibits NEXT. All of this is done better and tested more stringently than

Category 3 or 4, according to Scope.

PAY A LITTLE, GET A LOT

Williams said the price gap between Category 3 and 5 is closing. "Category 3 pricing has been pretty stable for some time," he said. "But Category 5 pricing is still changing. It's been a hot area for the last two years, with several manufacturers competing on price.

Originally, there was a good premium over Category 3 wiring, but that has steadily declined. The difference ends up being about \$10 to \$15 more per user for Category 5, but when you amortize that over five years, it's just-

tifiable to put in the higher quality cable," Williams added. "Especially when you look at the fact that it will cost you 10 to 20 times that to change out the cable when you find your needs have changed. It's definitely more cost-effective to put in Category 5 from the outset."

And with the advent of ATM, Category 5 should get an added boost. "Now vendors are showing that you can run 155M bit/sec ATM on Category 5 cable," he said. "When you compare 155M bit/sec dedicated to each desktop with today's Ethernets, which share 10M bit/sec among 25 users, that's almost a couple of orders of magnitude better. We don't see many people needing much more than that."

WHY NOT FIBER?

Although fiber offers the highest possible bandwidth and would seemingly insulate you from whatever technologists cook up next, users are not rushing to install it.

"Fiber offers the high bandwidth, but it's also more expensive, and it's more difficult to install and work with," Williams said. "If Category 5 can do the job, is easier to work with and cheaper, why go to fiber?" Williams recommended using fiber as a backbone, however, "because you're connecting critical resources so you need the faster links there."

Anixter's Myrick, however, thinks fiber may be on the upswing. "I think fiber is the safest bet right now," he said. "The problem is most LANs today are Ethernet or token ring and the electronics are already in place. To install fiber, users have to swap out all those components.

Category 5 is still dwarfing fiber, but we think there will be more people coming out with electronics to support fiber to the desk."

Still, fiber is sometimes the only choice.

"We have concentrators and nodes spread out between several buildings in a campus-type environment," explained Michael Pate, senior engineer and network analyst at AlliedSignal Technical Services Corp., which supports the Johnson Space Center in Houston. "We wanted to get past the link limitations of Category 5 by using fiber, but we encountered a number of problems in that process."

For one, although fiber is impervious to electromagnetic interference and can be run where copper cannot, fiber requires use of special raceways. "We pretty quickly found out that we didn't have the infrastructure in the buildings on the campus to support a large-scale fiber-optic plant," Pate said.

Each time the firm added a new Ethernet hub, it needed to run another fiber to each of its other hubs throughout the campus, and it simply ran out of cable space in the raceways. By comparison, UTP does not require special raceways.

But Pate said UTP was not an option because of the great distances that needed to be spanned at the Johnson Space Center campus. In the end, a special company was called in to "completely redesign our cable raceways to support the fibers," he added.

One benefit of fiber is that its capacity is dictated mostly by the electronics at either end. To limit the need to run new fiber between buildings, AlliedSignal is considering swapping out Ethernet interfaces and moving from 10M bit/sec up to ATM speeds. "That type of bandwidth would help us cut down on the number of fibers we need between buildings," he said.

In addition, Pate said his company is no longer considering an eventual move to FDDI. "At one time, we felt we would make our facil-

See Wiring, page L14

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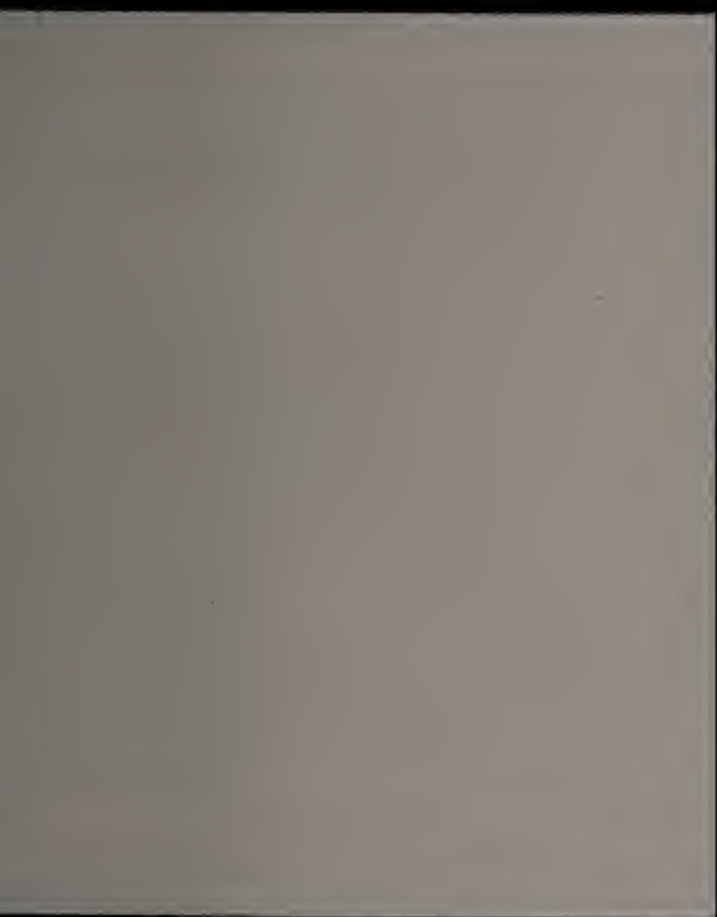
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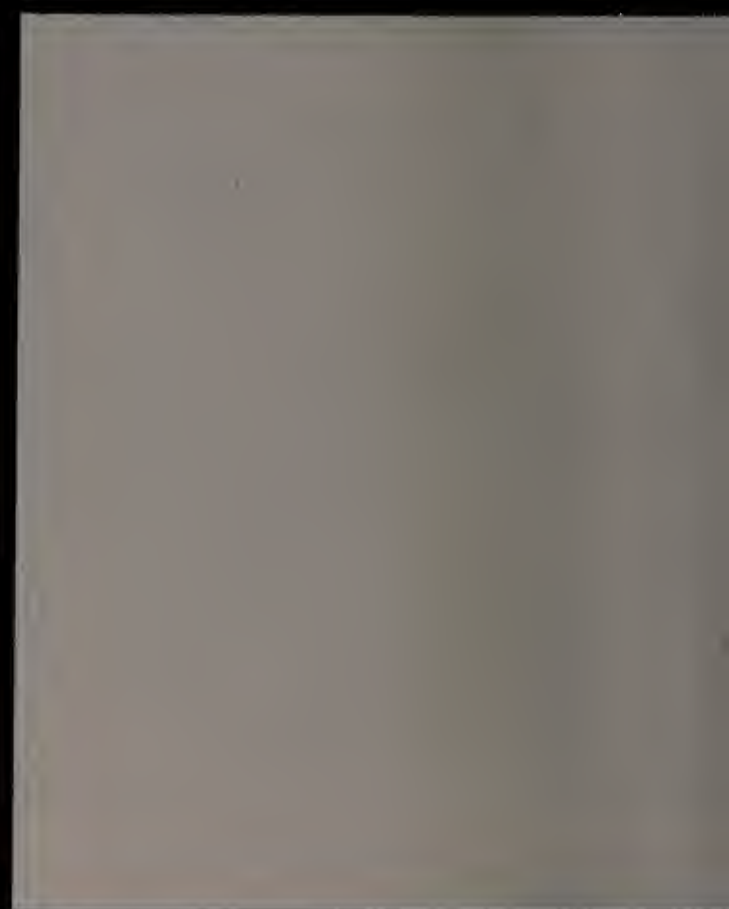
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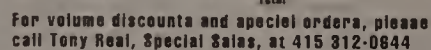
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Internet

Continued from page L1

"gateway" it over to a proprietary E-mail system such as Apple's Apple Open Computing Environment (AOCE) Mail, CE Software, Inc.'s QuickMail or Microsoft Corp.'s Microsoft Mail.

The primary vendor of such gateways is StarNine Technologies, Inc. in Berkeley, Calif. For AOCE Mail, StarNine provides both a personal POP gateway, which resides on Apple clients running PowerTalk, and a server-based

SMTP gateway for Apple PowerShare servers. In addition, it has SMTP gateways for QuickMail and Microsoft Mail servers, as well as a number of other useful mail and directory service products.

USENET

Usenet news is probably the second most popular service on the Internet. For those who have never read news, Usenet is a loose agglomeration of news servers that distribute threaded articles among themselves using the Net News Transfer Protocol.

The articles are categorized in one or more

topical news groups, of which there are currently about 7,000, ranging from academic discussion of protocols at the bit level to the epistolary equivalent of barroom brawls over sports, religion and world politics.

Users' client applications connect to news servers using the Net News Reading Protocol (NNRP) to read, reply to and post new articles to their local server, which then disseminates the new articles across the rest of the net or perhaps only to a couple of other local servers, depending on the way security and distribution have been set up on the server.

There are a number of NNRP freeware cli-

ent applications for the Macintosh. Foremost among them is probably NewsWatcher; other major clients are InterNews, Nuntius and TheNews.

None of these news readers require that the server be local; they allow you to connect to news servers anywhere in the world, provided that you have got IP connectivity. They do, however, work with the news servers to enforce security, so you'll need an account on a news server in order to be able to read news from or post news through it.

There's another class of news readers for
See Internet, page L17

NetWare 4.0

Continued from page L6

ment. Novell said it is aware of the issue but does not anticipate making changes anytime soon. "You have to be pretty careful how you price your golden calf," Doyle noted.

Performance and complexity have been the other obstacles to rapid acceptance. Analysts and resellers claim Versions 4.01 and 4.02 have eliminated most of the system bugs, and 4.02 has taken strides toward simplification that should appeal to organizations that are not ready for a major change in net administration.

With 4.02, companies or departments that want to escape — at least temporarily — the heavy planning demands of the 4.0 directory service will now be able to default with ease to bindery emulation mode. Those users still gain the benefits of disk allocation, compression and data migration without the headaches — and sometimes the political battles — of setting up the directory.

There is no consensus as to whether 4.1 will deliver high-octane acceleration in both confidence and performance. Forrester Research, Inc. in Cambridge, Mass., said 4.1 will result in "an avalanche of upgrades." Others said the next version is likely to have special appeal only for holdouts longing for the ability to "cut, prune and paste" their NetWare Directory Service trees.

WHEN THE MIGHTY STUMBLE

When the giant in any market sector takes an apparent misstep, the thud reverberates throughout the industry. Novell does not pretend to have made a perfect launch with its latest product, but the company is not about to don sackcloth, either.

"When we first came out of the chute, we probably missed the market," Novell's Corey conceded. Although half the firm's sales were to companies with fewer than 100 employees, 4.0 appeared to have been designed for large enterprises with complex networks.

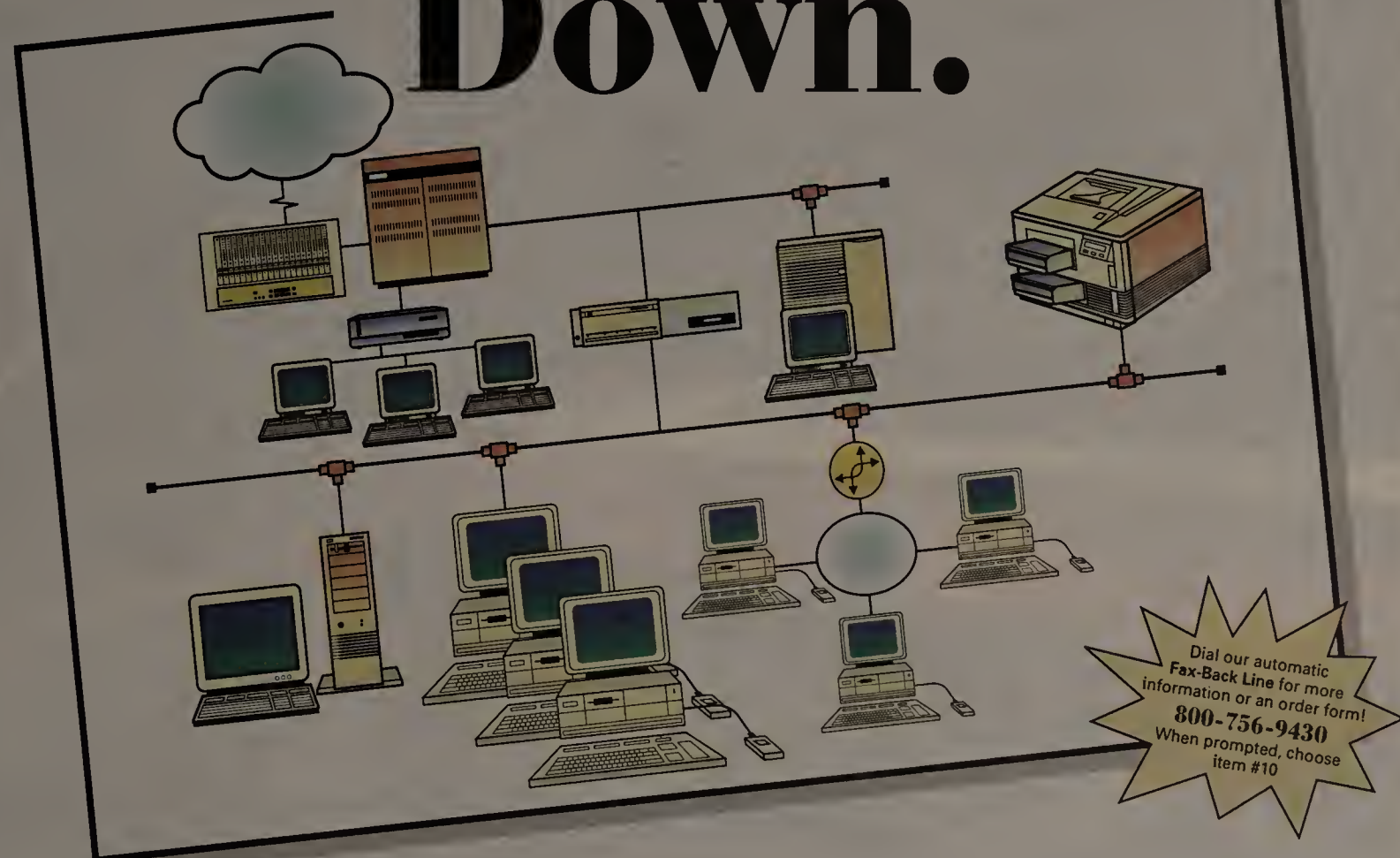
"We've come to realize it was mainly a communications barrier" that scared some buyers, he said. When Novell emphasized the importance of careful planning for a directory that would be difficult to alter later, many companies began to look fondly on their 3.X systems.

Even now, small shops are likely to say, "Stop bothering me — 3.X is fine," Doyle explained.

If smaller organizations are reluctant to make the leap to 4.X, NetWare's creators take an attitude of patient admonishment. "We say to them, 'You will need this in the future if you're going to grow,'" Corey said. "They certainly know there's a big revolution coming."

♦ Martin is a business and technology writer in Cambridge, Mass.

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Internet

Continued from page L15

users who do not have direct, full-time Internet connections. ToadNews is a common news reader for people with UUCP dial-up news feeds. It integrates some of the features of a news server so that news reading and posting can be accomplished "off-line" at the expense of convenience. UUCP news feeds are not for the faint of heart, though, as they're extremely difficult to configure and maintain, relative to Macintosh-based NNRP clients.

HyperText Transfer Protocol (HTTP) is the protocol that the World-Wide Web (WWW) is based on. Mosaic, the name of the most widely used Macintosh HTTP client, has unfortunately become nearly synonymous with the protocol and its set of services — much to everyone's confusion. But that illustrates its extreme popularity.

Some people have hailed the WWW of HTTP servers as the "killer app" that is driving mainstream acceptance of the Internet, and while that's probably overstating the case somewhat, there is some truth to that assertion.

HTTP clients provide a point-and-click mouse-based windowing interface to Internet-based multimedia hypertext documents. Simply put, it means that users can view documents that include sound, text, color pictures and movies side by side on the same formatted page, and any of these elements may be a hot link to another document located anywhere on the Internet.

Some people have hailed the WWW of HTTP servers as the "killer app" that is driving mainstream acceptance of the Internet.

Thus, a web of cross-referenced documents has sprung up, somewhat haphazardly, allowing users to pursue chains of interest or inquiry ad infinitum from server to server, around the world, all without doing a

thing except for clicking their mouse buttons on pictures and buttons.

HTTP CLIENTS

There are three main HTTP clients for the Macintosh. The University of Illinois, Urbana-Champaign's National Center for Supercomputing Applications' vastly popular Mosaic client also runs under the X Window System and Microsoft Windows on Unix machines and personal computers. It sets a high standard for viewers, keeping pace fairly well with new developments in the protocol and interface innovations on the host platforms. The vast majority of WWW users employ Mosaic exclusively.

Enterprise Integration Technologies is involved in an effort to produce an HTTP client for commercial distribution, but to date, it has only come up with MacWeb, a somewhat buggy freeware client.

The third option, CERN's MacWWW, is a truly minimalist HTTP client that does not display anything but text and hot links. It makes up for this deficiency, however, with the inclusion of a detailed console, which logs the document interpretation process, making MacWWW an ideal tool for network administrators setting up servers and debugging new documents.

There are also Macintosh client implemen-

tations of ftp, the standard File Transfer Protocol (FTP) on the Internet, and Archie, the corresponding server query program.

FTP allows the retrieval of individual or multiple text or binary files from individual directories within a defined file structure, generally on Unix hosts.

In addition, users should be able to use FTP to transfer files in and out of their home directories on any Unix hosts where they have accounts, using their full logon and password, of course.

Archie is a protocol used for searching for files that you believe may exist on some FTP

server somewhere on the net. By composing a query containing a substring of the name of the file you're looking for and sending it to an Archie server, you can procure a path name listing to matching files on all of the public FTP servers known to the Archie server that you have queried.

Although none of these servers are absolutely authoritative, many have very thorough coverage of publicly accessible servers.

FTP file-transfer Communications Toolbox (CTB) tools are common in the Macintosh world, and they can transform any CTB-compliant terminal-emulation software into an

FTP client.

More popular with users, however, are Fetch and Anarchie, all-in-one client tools. Fetch is an easy-to-use FTP client from Dartmouth College in Hanover, N.H., that integrates file-format conversion functions, making it easy to upload and download Macintosh files to and from Unix file servers, converting to and from BinHex format on the fly and unstuffing Stuffit-formatted results automatically.

Fetch is ideally suited to browsing the large FTP archives on the net, like Stanford University's Sumex-Aim and Washington University's Sumex-Aim and Washington University's Sumex-Aim. See Internet, page L18

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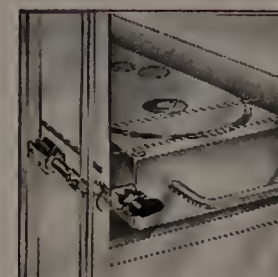
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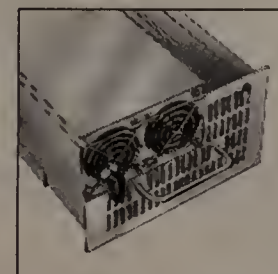
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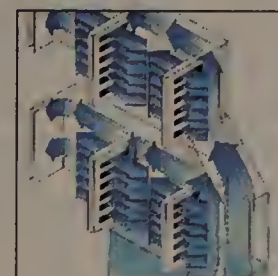
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Internet

Continued from page L17

ty's WuArchive, or simply doing routine file transfers in and out of your own local Unix shell account.

Anarchie, a useful tool from Peter Lewis, integrates an Archie querying tool with a slightly less-comprehensive FTP client, making it more appropriate for finding a file, sorting through all the possible locations on which it might reside and pulling down a copy from the most likely looking source. Other FTP cli-

ent implementations with different strengths are in development in various commercial software houses.

There are a huge number of other Internet protocols and services that boast their own Macintosh client applications but are less widely used.

One of the more interesting ones is the Network Time Protocol (NTP), which allows you to derive the accurate time from any of the atomic clocks attached to the Internet. Steve Dorner's Network Time, a Control Panel, is probably the best Mac NTP client, as it allows a wide range of time zone and daylight-savings

options and is able to set your local clock periodically rather than just at start-up, as many of the others do.

MACS AS SERVERS

As well as giving your users the ability to access services provided by others on the Internet, you'll also probably want to give them access to local IP services and to make services of your own available to users elsewhere on the Internet.

There are a number of Macintosh-based IP servers. Again, mail is likely to be of paramount importance. If you use an SMTP-native

mail client, that is all you need to exchange mail with any other SMTP mailer on the Internet.

In order to find them by name, however, you will also need to specify a name server in your MacTCP control panel. If you do not have a local Unix host acting as a name server, simply configure a "hosts" file for each of your local Macintoshes, then point them directly at one of the Internet's root name servers.

There are a number of FTP server applications and system extensions for the Macintosh, both commercial and publicly distributable. By far the most common is FTPd, another fine application from the inimitable Peter Lewis.

Less full-featured, but faster performing alternatives are available from Applied Software Concepts and other commercial vendors. NCSA's old Telnet application also contains an FTP server, which acquired a bad reputation after many users misconfigured NCSA Telnet such that their hard disks were published with all files publicly accessible; that feature has since been made safer.

Another great Macintosh server application is Chuck Shotton's MacHTTP, which turns any Macintosh into a full-fledged Hyper-Text Transfer Protocol Server capable of serving complex multimedia documents to any HTTP client, such as Mosaic. Where httpd, the Unix-based server daemon, calls Unix shell scripts to complete multistep data queries and the like, MacHTTP is completely AppleScriptable, so anything else you can address with AppleScript commands can be controlled via, or can supply information to, users of remote HTTP clients.

Servers such as WAIS (the Wide Area Information Server), BIND name service, Usenet news and NTP — for which there aren't Macintosh operating system-based server applications — run under A/UX on platforms all the way from the original Mac II to the Workgroup Server 95.

ROUTING APPLTALK

In addition to providing host services and acting as Internet service clients, Macintoshes can be used to route traffic across the Internet between geographic disparate AppleTalk networks.

Apple's AppleTalk Update-based Routing Protocol (AURP) is an AppleTalk border gateway routing protocol and an AppleTalk-in-IP tunneling method all rolled into one.

An AURP router has both an AppleTalk port and an IP port, and communicates with other AURP routers using IP. Therefore, if you have several sites that are all connected to the Internet, you can use these preexisting connections to pass AppleTalk traffic between your sites, as well, for items such as AppleShare servers, AOCE Mail or QuickMail, and laser printing.

Depending on the throughput of your Internet feeds and your security concerns about routing internal traffic across public networks, it may not be practical to use such a connection routinely, but it is a great convenience for occasional use.

Hundreds of publicly accessible zones from companies, universities and research institutions are available directly from the Chooser of any Macintosh at an AURP-connected site, just as though they were local, albeit a tad slower.

♦♦ Woodcock is the president of Zocalo Engineering, an AppleTalk and IP network consulting firm in Berkeley, Calif., and is the author of *Networking the Macintosh*.



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Circle Reader Service #7

GLOBAL SERVICES

Voice, Data and Wireless Services, Regulatory Issues and Voice CPE

BRIEFS

CompuServe, Inc. has announced plans to add Integrated Services Digital Network access to its X.25 and frame relay services. The carrier expects to support ISDN access to frame relay nets early next year, and has similar plans for X.25.

Applications will include backup for dedicated frame relay links. The service also promises to reduce access costs for users. Pricing will depend on local exchange carriers' ISDN tariffs, but CompuServe hopes to offer a uniform nationwide pricing scheme.

NYNEX Corp. is using a promotional carrot to introduce an ISDN Anywhere service in Massachusetts.

To provide its **Integrated Services Digital Network** coverage, NYNEX will run a digital line from a local central office to an ISDN-equipped foreign central office. Through Jan. 6, 1995, subscribers to virtual ISDN service will pay only regular ISDN line and usage charges. After that, the service will cost \$190 for installation and \$32 per month per Basic Rate Interface, in addition to the regular charges.

The Washington, D.C. police force said last week that it has put together a wireless data communications system to improve police operating procedures.

The city's Mobile-Link system from **Info-tech International** is based on **RAM Mobile Data's** two-way packet radio network. The communications system allows officers to run record checks from pen-based computers in patrol cars, and reportedly speeds dispatch and reporting procedures.

MCI gets aggressive with SMDS pricing

BY BILL BURCH

Atlanta

MCI Communications Corp. put a price tag on SMDS last week, laying out a bold fee schedule that may build an SMDS following among companies with relatively open user groups.

"At the DS0 level, MCI's SMDS pricing is extremely aggressive compared to both private line and, under most circumstances, frame relay," said Chris Heckart, a senior consultant with TeleChoice, Inc. in Verona, N.J.

Low Switched Multimegabit Data Service pricing may be needed to build momentum for the service, given other drawbacks such as limited interconnection capabilities. So far the only working connection MCI has with a local exchange carrier is with Bell Atlantic Corp., which offers SMDS in nine local access and transport areas. For other users, MCI offers direct connections.

Although MCI is working on interconnection agreements with additional carriers, it is counting on low prices to pull in new users.

Pricing for MCI's Hyperstream SMDS comprises a monthly port charge based on access speed and a transport charge based on the number of megabytes transmitted. Users must also pay per-megabyte charges for local access at each end (see graphic).

For a five-node net with nodes separated by an average of 500 miles, SMDS is substantially less expensive than a fully meshed pri-

vate-line network, according to MCI. While the private-line network would cost \$58,250 per month, SMDS could link the sites for \$9,175 to \$19,685 per month, depending on usage. In general, SMDS is cheaper than private lines for fully meshed networks with four or more sites, the carrier said.

MCI's SMDS charges			
Port (monthly)		Local access (per megabyte)	
Rate (bit/sec)	Price	Speed (bit/sec)	Price
56K	\$50	56K	\$.006
1.544M	\$250	1.544M	\$.006
4M	\$750	4M	\$.005
10M	\$1,500	10M	\$.004
16M	\$2,000	16M	\$.003
25M	\$2,500	25M	\$.002
34M	\$3,250	34M	\$.001
Transport (per megabyte)			
Mileage	Cost below T-1	Cost above T-1	
0-249	\$.0169	\$.0135	
250-499	\$.0208	\$.0166	
500-749	\$.0248	\$.0198	
750-999	\$.0350	\$.0280	
1,000-1,999	\$.0444	\$.0355	
2,000+	\$.0600	\$.0480	

For a single 56K bit/sec connection, MCI has set monthly minimum and maximum charges of \$109 and \$343, respectively, depending on usage. A comparable frame relay connection with a committed information rate of 56K bit/sec would cost \$264 to \$397 per month, depending on mileage.

Overall, the \$109 per-month minimum charge for a DS0 looks like a great deal,

Heckart said. For firms that need to communicate with a range of other locations, SMDS looks far less expensive, but users will still need to do the math to figure out which service makes sense for other applications. Compared to private lines, SMDS looks good at all mileage ranges, she added.

On the equipment side, routers and frame relay assembler/disassemblers are more expensive than the customer premises equipment needed for frame relay or private-line nets. If users figure that customer premises equipment costs \$5,000 per site, SMDS gear will run around \$200 per month with a two-year amortization. Even with a slightly higher equipment expense, SMDS still looks attractive, Heckart said.

For users, uniform SMDS pricing should help in figuring out the service's potential.

In Maryland, Blue Cross/Blue Shield is running a 12-site SMDS network for file transfer, electronic mail, database access and other applications. The organization currently uses a pair of clear-channel T-1s to tie its data center into the SMDS cloud, but Frank Mooney, the firm's network technologies director, plans to examine MCI's pricing to see if it makes sense to switch the local connection over to SMDS.

MCI's SMDS offering could be particularly attractive for national networks, Mooney said, and he's interested in seeing which companies he can connect to in other states. Since both MCI and Bell Atlantic — Mooney's local SMDS provider — use Siemens Stromberg-Carlson switches for their SMDS offerings, the intercarrier connection should go smoothly, Mooney hopes. □

Vendors team on digital cellular spec

Companies pushing for acceptance of high-capacity CDMA.

BY JOANIE WEXLER

Irvine, Calif.

In this season fraught with radio spectrum auctions and cellular company mergers and alliances, another wireless consortium has been born.

A group of vendors calling themselves the CDMA Development Group (CDG) has linked arms to speed commercial deployment and interoperability of digital cellular products and services based on a technology known as Code Division Multiple Access.

The CDG includes AT&T and many of the Bell company cellular subsidiaries (see graphic).

CDMA is one of many wireless digital schemes under consideration as the foundation for budding broadband personal communications services. While CDMA is not yet commercially deployed, its proponents tout its potential for offering at least a tenfold capacity increase over today's analog cellular nets. That capacity

could lead to economies of scale and low costs for users, observers said.

"We're committed to it because of the capacity relief," said Sal Cinquegrani, a spokesman for CDG member Sprint Cellular Co. "How soon will it be before other technologies are taxed?"

CDMA Development Group members (partial list)

- ▶ AirTouch Communications
- ▶ Ameritech Cellular Services
- ▶ AT&T
- ▶ GTE Personal Communications Services
- ▶ Motorola, Inc.
- ▶ Nokia Mobile Phones, Inc.
- ▶ NYNEX Mobile
- ▶ QUALCOMM, Inc.
- ▶ Sony Electronics, Inc.
- ▶ Sprint Cellular Co.
- ▶ US WEST Cellular

A spread spectrum-based technology, CDMA allows multiple cellular voice and data conversations to take place simultaneously by outfitting each transmitted bit with a conversation-specific identifying code. These bits can be distinguished by the receiver, which captures those pertaining to a particular conversation and ignores others.

This eliminates the need to use bandwidth for guard bands or guard times to prevent interference between frequencies or time slots, as with other transmission methods.

CDMA is inherently efficient and secure, observers said, but requires

See CDMA, page 60

Cellular bedfellows

McCaw Cellular Communications, Inc. might be joining the wireless industry's consolidation craze. McCaw is talking to other cellular providers, among them Southwestern Bell Corp., about blending wireless resources to quell user demand for seamless nationwide radio coverage.

Recent reports indicating that McCaw and Southwestern Bell were close to an official alliance, though, were overblown, according to McCaw spokesman Bob Ratliffe. "We're always looking for ways to improve our footprint and service offerings, but we're not close to announcing anything," he said. "We're talking to Southwestern Bell and others."

If consummated, a McCaw alliance would complement other recent deals: ■ In June, Bell Atlantic Mobile and NYNEX Mobile said they would combine their cellular operations.

■ Late last month, US WEST Cellular and AirTouch Communications said they would form two joint companies: one to run their merged cellular operations, and the other to bid at the upcoming Federal Communications Commission auction for broadband personal communications services spectrum.

■ Early this month, Ameritech Cellular Services confirmed it is looking to merge its operations with one of the two above alliances.

The impetus behind all the movement is that carriers have been touting the anywhere, anytime communications concept, but as of yet have not figured out how to deliver it.

Many companies offer only regional cellular services today, while those with nationwide services provide them in selected sites with wide gaps in between.

BY JOANIE WEXLER

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RATE & TARIFF MONITOR

by Eric Paulak

Stay tuned for less expensive phone rates

Congress is on its way to making the biggest impact on telecommunications since the Communications Act was first passed in 1934: It

wants to open the local phone market to competition, lift the long-distance ban on Bell companies, and let cable and telephone companies get into each others' businesses.

Apparently, Congress isn't moving fast enough for Southwestern Bell, though. The regional Bell holding company is seeking approval from the Maryland Public Service Commission (PSC) to offer local business and residential phone service in some of Bell Atlantic's region through its newly acquired cable TV company.

What impact will the entry of a cable company into the local service business have on users in Maryland's Montgomery County, where initial services would emerge? Southwestern Bell says it will result in local phone bills that are 15% to 20% cheaper, and many

high-priced consultants and analysts agree.

Southwestern Bell has proposed that it offer local phone, voice mail and caller ID services to 340,000 households over its new system, Cable TV Montgomery, in that wealthy Washington, D.C. area.

The Maryland PSC has until Feb. 28 to endorse the plan. Approval is widely expected, and service could start as soon as third-quarter 1995. The PSC, Bell Atlantic and Southwestern Bell must negotiate beforehand, however, how much Bell Atlantic can charge for access to its network, and Southwestern Bell will have to invest about \$130 million to build a new net infrastructure.

Competitive access provider Metropolitan Fiber Systems (MFS) went through an identical negotiating procedure with Bell Atlantic and the Maryland PSC before it could offer local business services in the state.

In return for getting into the market, MFS has to pay Bell Atlantic \$.061/call to help pay for lost revenue from the Bell company that would have gone into the state's Universal Service Fund.

If Southwestern Bell has to shoulder similar charges, it is either not going to make any money, or it will have to charge higher rates that will eat into the promised 15% to 20% discounts.

No matter what Southwestern Bell has to pay for access, however, it should be able to squeeze out enough profit to undercut Bell Atlantic's local rates. The reason: Southwestern Bell has been very successful on a similar CATV-phone venture in the U.K., despite heavy regulatory control there.

ALL'S FAIR

Another CATV provider-turned-phone company is Time Warner. The second largest cable provider has filed with the New York State PSC to offer phone service to its cable customers in Rochester by the end of 1995.

An advantage this plan has over Maryland's plan is that Time Warner and Rochester Telephone agreed to charge each other the same rate for completing calls over the other's network. So, unlike in Maryland, the cable provider won't be required to pay any more than the phone company for access services. This leaves Time Warner in a better competitive position, which bodes better for prices.

Full approval on the plan is expected in the fall. If all goes well, Time Warner plans to offer phone service over its cable networks in about 25 other cities by 1999.

And if Congress acts on its telecommunications legislation this session, you could see more cable firms offering phone service over their nets as early as 1995.

So keep your eyes peeled. If you have a cable company that already offers intelligent services (pay-per-view, for example), the only things it needs to offer phone services are switching equipment and a new set-top box, and most cable providers have already put out requests for proposal on the equipment.

♦ Paulak is associate publisher for the Center for Communications Management Information, a provider of rate and tariff information in Rockville, Md. He can be reached at (301) 816-8950, Ext. 327.



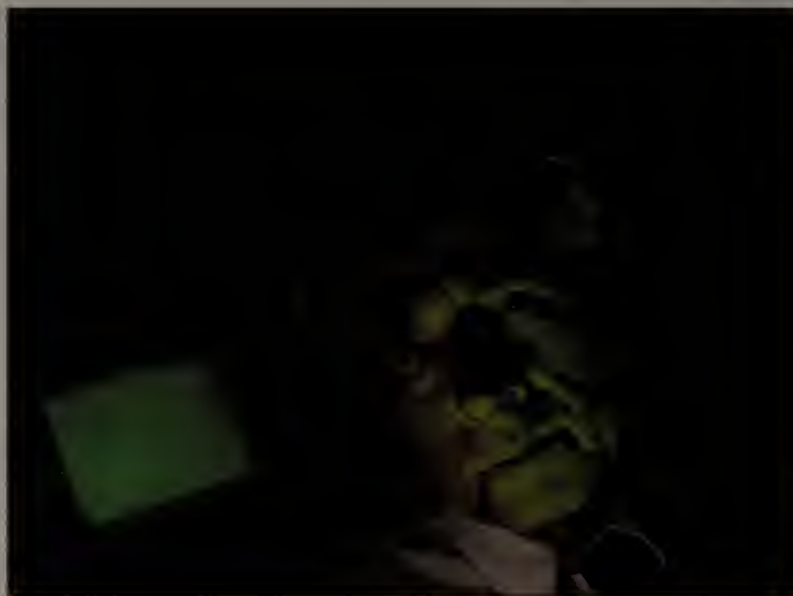
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Bill Jones, MIS, age 38

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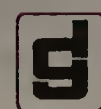
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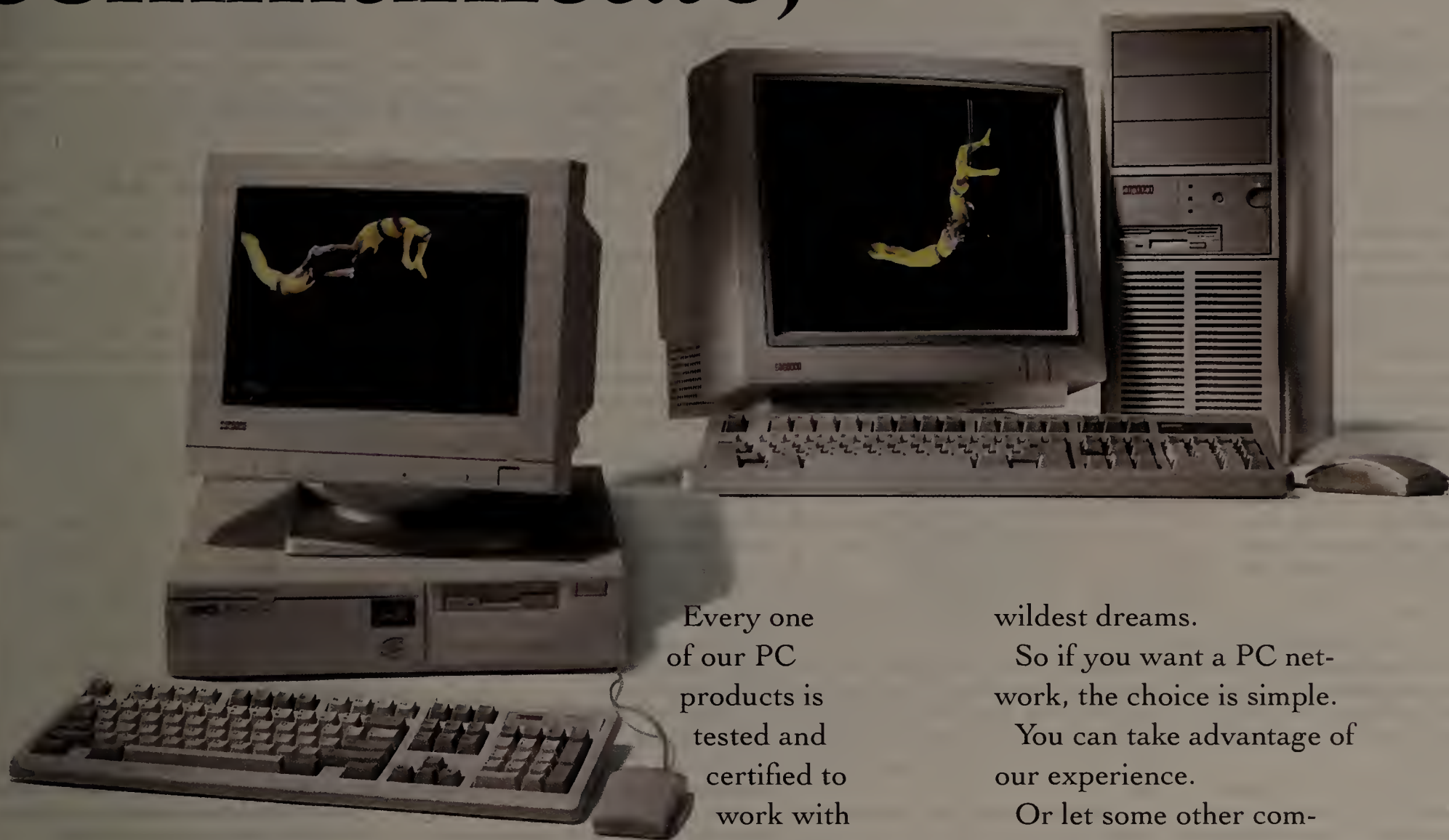
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Cellular users struggle to tie into virtual private nets

BY JOANIE WEXLER

Atlanta

Users are slowly gaining the ability to make cellular phone calls from outside their home serving areas into virtual private networks using corporate dialing plans.

Recent strides by MCI Communications Co., Sprint Corp. and AT&T, in conjunction with the nation's cellular carriers, enable roaming users to initiate wireless calls across geographic areas with their seven-digit dial schemes. This encourages them to hop on the corporate net more often to leverage volume discount plans.

MCI, which offers Vnet Cellular as an extension of its Vnet virtual network service, for example, earlier this month announced a roaming option in Bell Atlantic Mobile's (BAM) mid-Atlantic markets slated for availability later this year.

That introduction follows more widespread, two-year-old services from AT&T and the recent delivery of roaming from Sprint — also in conjunction with BAM — in parts of the Southeast.

Vnet Cellular Roamer will allow MCI Vnet customers to roam the greater Philadelphia, Pittsburgh, Baltimore and Washington, D.C. areas (see graphic) and initiate calls using their choice of an 8- or 1-700-plus dialing plan. BAM will automatically map the calls to MCI's Vnet database.

BAM has also teamed with Sprint and is negotiating with AT&T to provide similar services to those carriers' virtual net customers, according to BAM spokeswoman Maggie Aloia.

CARRIER'S ROLE

Providing roaming callers with access to virtual networks is made possible by software on the cellular carrier's switches that recognizes a customer's preferred long-distance carrier. In the case of MCI Vnet Cellular Roamer, BAM provides the customer with Vnet features, completes calls at Vnet rates and counts calls toward the company's Vnet volume discounts, explained Jim DeMerlis, MCI's director of Vnet marketing.

Completing cellular calls at Vnet rates, according to MCI, could save users as much as 50% on mobile calls over cellular carrier rates.

Without roaming services, users have to dial their carrier's special code and possibly their entire calling card number and personal identification number to extend virtual net capabilities across cellular territories.

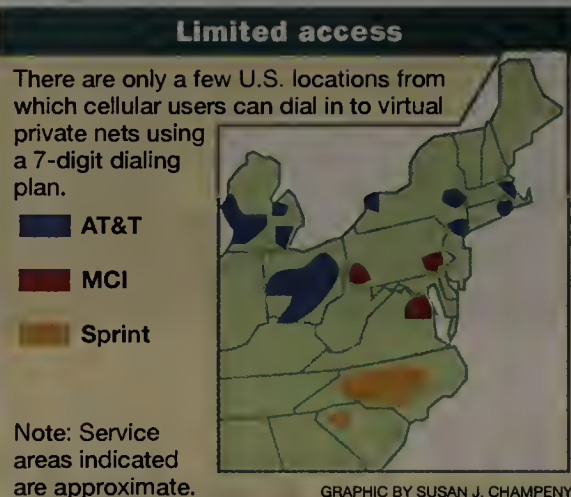
Despite the progress in building consistent cellular roaming dial plans, blending cellular and virtual long-distance calls remains largely inconsistent across territories and confusing, observers said.

The reason is that for now, users have to know too much about the area they are travel-

ing in to make the services convenient. There is no standard process for programming a customized dialing feature into a cellular switch today, according to the Cellular Telecommunications Industry Association.

This means that cellular and interexchange carriers must work together piecemeal to provide roaming services.

The disjointed roaming schemes from today's patchwork of cellular nets mean "now users have to know where they can use [their



corporate seven-digit dialing plans] vs. when to dial their whole calling card and PIN sequence," said David Wright, director of telecommunications at Gannett Company, Inc., an MCI Vnet customer in Arlington, Va.

"It's too confusing. It won't happen here," he said.

Mark Langner, senior consultant with TeleChoice, Inc., a consultancy in Verona, N.J., described the state of cellular access to virtual private nets as "terrible."

He said it is asking too much for a mobile user to know if the corporate dial plan works in a given area and, if so, to which carrier to set his cell phone.

Many territories are supported by more than one cellular carrier, so the user must flip a switch on his cell phone to specify access to the carrier offering the roaming service.

This situation discourages traveling workers from trying to access the corporate net and take advantage of the corporate volume discount plan, he said.

ROAMING STATE

Of the Big Three long-distance carriers, AT&T is furthest along in allowing roaming users of its Software Defined Network to use their familiar dial plans from cellular phones. AT&T offers seven-digit cellular SDN roaming across about 30 Eastern cities today (see graphic).

In addition to its work with BAM, Sprint has teamed with BellSouth Corp.'s MobileComm subsidiary and US WEST Cellular to deliver nationwide seven-digit cellular dialing, said Marcus Canipe, director of VPN product marketing.

Canipe said the capability will be in cities across the country in the fourth quarter of this year or the first quarter of 1995.

MCI would not provide specific details about its plans for nationwide roaming but said it is working with several cellular subsidiaries of local exchange carriers across the country to deliver the capability. □

ATM Report

Continued from page 20

to it. This function of data forwarding is independent of the process of address resolution described above.

This two-level structure allows LAN emulation client systems to operate in various ways and still retain interoperability with servers and each other. If the application cannot wait for an SVC, the BUS server can be used to forward the first few messages, with an SVC to follow. If the application can be "held up" until the SVC is established, the BUS server need not be used.

Since ATM testing procedures are working their way upward from the lowest level of ATM interface — the physical layer — interoperability testing of very high-level functions such as LAN emulation is likely to be handled through informal vendor demonstrations.

The LAN emulation group, however, is developing a diagram to describe interactions among LAN emulation clients and servers. This should facilitate informal testing and provide a basis for formal testing.

Moving away from LAN emulation is essential if ATM's special multimedia benefits are to be justified, but migration requires something to migrate to. As yet, there are no standard APIs that developers or users can employ to call on ATM services.

This may be the most important omission in the ATM arena and also the one most difficult to correct. Standards bodies have had trouble coming to grips with APIs, since they exist within a user's system and don't relate to public policy issues like open carrier interfaces.

ATM hub vendors like Fore Systems, Inc. have already provided APIs, and IBM has said it will do the same in a later phase of its ATM product rollout. In the ATM Forum, there was an active debate on whether low-level APIs, such as a Windows API, should be defined, or whether the forum should instead define a high-level or generic API set that would be the basis for further development.

APIs are not always seen as an interoperability issue since they deal primarily with application portability from platform to platform. But if an API selects an optional ATM feature, it may not work with equipment or services that don't support that option. A high-level description of the services to be made available, called a semantic, would help prevent this.

The Service Aspects and Applications working group recently adopted the high-level approach and hopes to present a draft recommendation in the first quarter of 1995.

The forum also agreed to establish liaisons with other consortia that are defining, or may later define, APIs. This would prevent standards or trade groups from going down different paths and creating demand for a protocol feature not supported in the ATM UNI.

Application services and APIs are the area where changes are most likely to occur because every ATM application can be a source of new requirements. Vendors also often look at this area to provide their proprietary differentiation that gives their products an edge in the market.

Just as APIs and application services have diverged in today's data network architectures (Systems Network Architecture and TCP/IP, for example), they will probably do so with

ATM. Users can expect interoperability testing for major applications such as LAN emulation and major APIs like WINSOCK; but many applications and APIs will be left to the user to validate, just as they are today.

THE UPSHOT

A quick glance back at the six interoperability categories shows that in only one area have we moved beyond the midpoint of the progress chart. But that doesn't mean ATM is being held back by bickering in the standards bodies or by a lack of attention to key issues.

Every communications standard implemented to date has been offered in the market before formal testing can prove conformance to the standard. Early adopters, eager to gain competitive advantage, simply factor the cost of private interoperability testing into the project, or force vendors to demonstrate interoperability as a condition of purchase.

But every successful technology must also reach a stage where users can acquire products that tie into existing networks without all that private integration work.

At some point in the future, ATM will either fail or become a pervasive commodity technology, one whose components can be interchanged without any special thought or insight. That point will arrive at different times for different users, so every user must understand how close to being a truly universal technology ATM is.

We've already come a long way, but we have far to go.

The next ATM Interoperability Report will be published in November. For more information, contact Network World via the Internet at network@world.std.com or Nolle via MCI Mail at 349-5845.

♦♦ Nolle is president of CIMI Corp., a technology assessment firm in Voorhees, N.J.

Category definitions

- **User interface standards**
Standards describing the connection between a user device and a network, or another device whose role is to emulate network services.
- **Switch and carrier interworking standards**
Standards describing the interface between carrier networks or between ATM switches or nodes.
- **Adaptation-layer standards**
Standards describing the conversion of native network user information forms, such as frames and bit streams, into cells.
- **Quality-of-service definitions and assurance**
Standards or recommendations that define the quality of ATM service and means for enforcing specified service levels, or protocols designed to control or assure quality of service.
- **Signaling standards**
Standards defining exchanges between user equipment and the network for connection management or service management.
- **Application services and APIs**
Standards defining higher layer protocols to be used with ATM to provide specific application services — including convergence functions that adapt ATM transport to other services like frame relay — and LAN emulation and encapsulation standards. Also include APIs designed to provide direct program access to ATM services.

CLIENT/SERVER APPLICATIONS

Distributed Databases, Messaging, Groupware, Imaging and Multimedia

DEVELOPMENT ALLIANCE

TI will team with others to link their apps tools

BY ADAM GAFFIN

Plano, Texas

Texas Instruments, Inc. said last week that it will open up its application development software to let it work with tools from other vendors.

Texas Instruments IEF development partners

Company	Application area
Applied Business Technology Corp.	Project management
AutoTester, Inc.	Applications testing
BenchMark Technologies, Ltd.	Development management
BrownStone Solutions, Inc.	Repository software
Business Objects, Inc.	Query and reporting software
Castek Software Factory, Inc.	Software reuse
PeerLogic, Inc.	Middleware

The firm announced plans to publish over the next few months a series of technical specifications and application program interfaces (API) for its Information Engineering Facility (IEF) application development tool. It also detailed alliances forged with other tool vendors that have agreed to help design

the APIs. The moves could help TI avoid the fate of IBM, whose AD/Cycle initiative foundered in the face of criticism over its proprietary, closed nature.

"We've come to realize we cannot do it all," said Johnny Long, director of IEF products and services.

The announcement shows that TI is shedding its Texas cowboy attitude of thinking it knows the best ways to do things when users were saying they did not want to be limited to TI's proprietary tool set, said John Logan, executive vice president at Aberdeen Group, Inc., a Boston market research firm.

TI officials said they are looking at ways to integrate IEF with tomorrow's distributed object networks. They said first up will likely be integration with Microsoft Corp.'s Compound Object Model because of the work the two companies are doing to develop an object repository. But

See Apps tools, page 38

IBM to bolster workflow tool with modeling, testing technology

BY KEVIN FOGARTY

San Jose, Calif.

IBM plans to enhance its FlowMark workflow product by adding business-process modeling tools that will help customers construct and test how work flows through their companies.

The primary business-process modeling tool available for FlowMark in the U.S. will be a derivative of Sterling Software, Inc.'s Answer:Computer Aided Business Engineering (CABE) tool, according to Edwin Vogt, director of the IBM Deutschland GmbH research and development group responsible for enhancing FlowMark. Answer:CABE uses IBM's Line of Visibility Engineering Methodology to develop business-process reengineering applications, he said.

IBM will deliver tools to help users do their own modeling, rather than forcing them to rely on consultants. The company will also build, on a case-by-case basis, links to third-party tools using the FlowMark Development Language.

An accompanying simulation tool is being written by IBM from scratch, Vogt said.

Simulation tools let users assemble complex models of how their businesses operate, then run the models through their paces to see where delays and bottlenecks develop. Testing can help tune a workflow model that looks accurate but is missing some vital element, according to Vogt.

Users can run test simulations of FlowMark work-

flow models now, but they have to write the routines themselves using IBM's REX OS/2 application scripting language, Vogt said. The new tool will make the process easier to run understand by piping results into popular spreadsheet and graphical data visualization tools, he added.

The simulation tool, which will be built into FlowMark by year end, will let users run workflow models through their paces and output performance data to applications like Microsoft Corp.'s Excel. It will send data to these applications using industry-standard application program interfaces like the Lotus Development Corp.-backed Vendor Independent Messaging (VIM) and Microsoft's Messaging Application Program-

ming Interface, Vogt said.

Go with the FlowMark

Upcoming enhancements:

- Workflow modeling tool based on Sterling Software's Answer:CABE LOVEM product
- Simulation tool to test workflow models
- AIX servers, AIX and Windows clients

MAKING MAIL SMARTER

Big Blue will take another step in the development of a groupware product to compete with Microsoft's Exchange and Lotus' next generation of Notes by integrating its Ultimedia Mail/2 electronic mail product with its IntelliAgent software agent software and its DB2/2 database. It plans to deliver the integrated product by the first quarter of next year.

Ultimedia Mail/2 will form the core of a groupware product IBM plans to assemble by combining existing mail, conferencing, document management and workflow products with other applications.

See IBM, page 38

BRIEFS

WorldLinx Telecommunications, Inc. in Toronto this week will begin shipping free of charge "buddyware" with its Vis a Vis **desktop data conferencing** application.

When customers buy the \$195 Vis a Vis, they get a free copy to give to colleagues with whom they will conference. The buddyware version cannot dial out to initiate conferences and can only support two users on a conference at a time, unlike the full-function version.

Vis a Vis runs on DOS, Macintosh and Windows clients, and supports X.25, Integrated Services Digital Network, Network Basic I/O System, Novell, Inc. NetWare, IBM LAN Manager and Transmission Control Protocol/Internet Protocol networks.

WorldLinx: (416) 350-1000.

Lotus Development Corp. has announced an alliance with Intel Corp. that will add **live desktop videoconferencing** technology to Notes via support for Intel Corp.'s ProShare system. Unlike Lotus' existing Video

Notes product, which lets users store and replay video clips, Notes integration with ProShare will allow for real-time videoconferencing using PCs equipped with video cameras and Integrated Services Digital Network connections.

Lotus will build in most of the ProShare technology, including whiteboard and application-sharing functions, to Notes sometime next year.

Lotus: (617) 577-8500.

Corporate Software, Inc. has released an updated version of Mail Express — its **Notes-to-Microsoft Mail gateway** — that adds translation between data in Microsoft Corp. Schedule+ and Notes. Pricing for the gateway starts at about \$5,000 for as many as 1,000 users.

It also released Express Project Link, which connects Notes to Microsoft Project project management software via Microsoft's Dynamic Data Exchange technology.

Corporate Software: (800) 488-7583.

Cincom slashes DBMS prices for feds

Additional client/server reductions could be in store.

BY BARB COLE

Cincinnati

Cincom Systems, Inc. last week said it will sell its relational database to federal government agencies for just \$99 per server, plus offer discounts on its maintenance fees.

Cincom's Freedom Program will enable federal agencies to buy the company's Supra relational database management system running on Windows NT or OS/2, DOS or Windows client software, plus Open Database Connectivity drivers and middleware, all for the one price. Altogether, that software typically sells for \$3,000 to \$5,000.

In addition, Cincom said it would replace competing database servers running on Windows NT or OS/2 for 99 cents and immediately cut maintenance fees on the replaced servers by 15%.

The firms chose to target the federal government market because that market has been an aggressive client/server adopter,

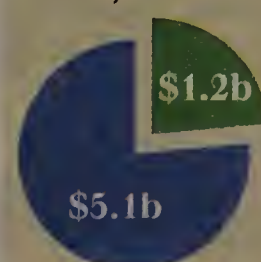
he said. Cincom officials declined to say if the company has similar plans for the general market.

Cincom's pricing move in the government market is part of a growing trend among vendors to seed the competitive low end of the client/server software market with cut-rate prices. Gupta Corp. last month, for example, said it would give away 50,000 copies of its SQLWindows client/server development tool.

"The second- and third-tier client/server vendors are being squeezed out of the market," said Tom Kurcharvy, president of Summit Strategies, Inc., a Boston-based market research firm. "Oracle and Sybase

dominate the high end, and at the workgroup and departmental levels, you've got Microsoft competing with very aggressive prices and bundling operating systems closely with their database."

The federal government will spend \$5.1 billion on new applications in 1995, \$1.2 billion of which will be spent on software maintenance, according to market research firm INPUT of Vienna, Va.



For most large database vendors, the push to become more competitive on price has centered on moving from server-based to user-based pricing. Informix Software, Inc. adopted user-based pricing last December, while Oracle Corp. did the same last month. Analysts said the next step may be for companies such as Oracle and Sybase, Inc. to offer software bundles or turnkey systems. See Cincom, page 38

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CA discloses its Ingres DBMS product integration strategy

BY BARB COLE

Islandia, N.Y.

Computer Associates International, Inc. (CA) has outlined its plans to integrate into the CA fold the Ingres products it acquired upon buying the The ASK Group, Inc. in June.

CA said it will integrate the CA-OpenIngres database server and CA-Manman manufacturing systems with CA-Unicenter, the company's systems management software. The company will also release at an unspecified time a special FastPath version of CA-OpenIngres tuned for high-performance processing systems.

database management tools in CA-OpenIngres by adding a graphical user interface-based component to simplify the administration of distributed and replicated data.

TOOL COMPATIBILITY

The CA-OpenIngres tools will also work with CA-Unicenter, which in turn can work in conjunction with Simple Network Management Protocol-based systems from Hewlett-Packard Co., IBM and SunConnect. From CA-Unicenter or one of these vendors' SNMP systems, net administrators will be able to change

OpenIngres user permissions, do backups and restore, and manage OpenIngres alerts, said Mark Sokol, CA's vice president of strategy. CA-Unicenter runs on Unix, Windows NT and OS/2.

On the development tool front, CA said the CA-OpenRoad tool

acquired from The ASK Group will share a common object repository, object browser, debugger, version control system and screen painter with development tools already offered by CA. These include CA-Visual Realia, a COBOL-like Windows tool; CA-Visual Ob-

jects, a tool based on a Windows version of the Xbase language; and CA-Visual Express, a Windows-based query and reporting tool.

OpenIngres users said CA's announcement gives them confidence that the Ingres products have a solid future. The main issue for these customers is understanding CA and its overall strategy.

"Ingres users aren't familiar with CA or its products. Users are no longer concerned about what's going to happen to the products, but they're interested in learning more about CA's product suites and how the Ingres products fit it," said Kitty Weaver, president of the North

American Ingres Users Association.

Weaver said she and members of the user group believe they can exploit the CA front-end development tools for rapid application development or application prototyping in conjunction with OpenIngres databases.

Analysts were encouraged by the breadth of CA's plans to merge the Ingres technology with its own. "I was particularly excited about their desktop development and systems management strategies," said Peter Kastner, a senior analyst at Aberdeen Group, Inc., a Boston-based research firm.

©CA: (516) 342-5224.

OpenIngres 1.1 delivery dates

CA-OpenIngres component	Beta release
Database server	Now
Gateways	Now
Star (management software)	December
Replicator	Now
Object extensions	Now

Note: All components will be generally available 2Q '95.

GRAPHIC BY TERRI MITCHELL

Gateways to existing CA mainframe database software — CA-Integrated Database Management System and CA-Datcom — will also be included in the next release of OpenIngres, Version 1.1.

With Version 1.1, CA said it will extend the

OBJECT-ORIENTED APPS

Lotus counting on OpenDoc to give Notes a new object layer

BY ADAM GAFFIN

Cambridge, Mass.

Lotus Development Corp. recently took another step toward integrating Notes with object-oriented applications and networks when it joined the Component Integration Laboratories (CI Labs), the outfit building a compound-document architecture based on IBM's distributed object technology.

Lotus stopped short of saying it would add support for all of CI Lab's OpenDoc compound-document architecture in the next major version of Notes, due to go into beta testing in January. Lotus has made such a commitment to Microsoft Corp.'s rival Object Linking and Embedding (OLE) Version 2.0.

Instead, Alex Morrow, product line architecture manager at Lotus, said his company will look at using pieces of technology developed by CI Labs and its backers, who include Apple Computer, Inc., IBM and Novell, Inc.

Morrow said Lotus is particularly interested in ways to integrate Notes with IBM's Systems Object Model (SOM) distributed-objects technology and with object frameworks developed by Taligent, Inc., which is part-owned by IBM.

SOM is designed to use objects built in several languages. Morrow said adding SOM support to Notes would make it easier to tie Notes applications to back-end object-oriented pro-

grams across a heterogenous network.

He said Lotus is also looking at a collection of objects developed by Taligent that includes some aimed at real-time workgroup collaboration across a heterogeneous network, something Notes now lacks.

Michael Goulde, senior analyst for the Patricia Seybold Group, Inc., a Boston consultancy, said the CI Labs agreement could also lead to Notes becoming a link between OpenDoc and OLE. If Notes documents are used as containers for both OpenDoc and OLE objects, "it opens them up to being a kind of brokerage" between the technologies.

He added that getting such a link to work would take considerable technical work by Lotus

and vendors that supply the object request brokers that are expected to provide low-level links between networked objects. Morrow said Lotus would work to spur development of these low-level links between distributed OLE and the Common Object Request Broker Architecture backed by IBM and other members of the Object Management Group.

But Tim Harmon, director of application development strategy at the META Group, Inc. consulting firm in Burlingame, Calif., said he doubted such a Notes bridge would work. Instead, he said, the main impact of the CI Labs deal is to put pressure on Microsoft to pump out usable OLE 2.0 applications. ☐

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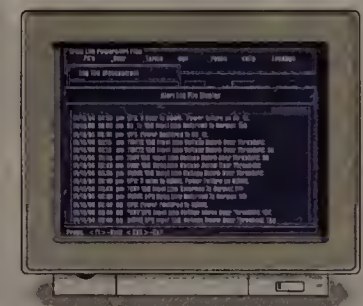


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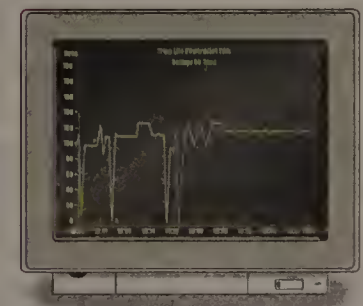
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Apps tools

Continued from page 35

they added that the company will also look to develop links to the Object Management Group's Common Object Request Broker Architecture, Version 2.0.

IEF has been enhanced for use in modeling and developing client/server applications across heterogeneous networks.

One of the first specification sets TI hopes to publish, within a month, is one for IEF's encyclopedia, which provides a framework for

tracking and connecting pieces of an application under development.

By year end, the company hopes to ship an API to allow users to easily plug other applications into the encyclopedia, as well as documentation on the messaging format used by IEF to link clients and servers. Additional APIs will be released over the next few months.

"As a user of IEF, an extensible encyclopedia is exciting to us," said Michael Quintero, senior technical analyst for Blue Cross/Blue

Shield of Florida, Inc.

Blue Cross/Blue Shield uses IEF as its platform for developing enterprise applications. Open APIs would allow its developers to continue to use other tools for building departmental applications that could be more easily plugged into the enterprise efforts, Quintero said.

Opening up the encyclopedia also appeals to Kelly Anderson, business analyst in planning and data administration at SaskTel, a telecommunications provider in

"As a user of IEF, an extensible encyclopedia is exciting to us."

Saskatchewan, Canada. The company mainly uses IEF as an analysis tool, so the ability to connect reporting and similar tools could be very useful, he said.

IEF is available on several platforms, including OS/2, Solaris 2.2, Windows and HP-UX. A Windows NT version is under development. It can be used to connect OS/2 and Windows clients to a variety of servers, hosts and databases, including MVS hosts, HP-UX and AIX servers, and databases from Computer Associates International, Inc., IBM and Oracle Corp.

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Cincom

Continued from page 35

tems that include their database servers, front-end development tools, connectivity and, perhaps, vertical applications at a competitive price as well as with lower maintenance fees.

"If Cincom's program is successful, it could force the other companies to cut their maintenance fees, at least in the government market," said Bob Deller, vice president of INPUT, a market research firm in Vienna, Va. Maintenance fees account for more than 50% spent on software by the feds, he added.

Users may see software bundles that pair best-of-breed client/server software from multiple vendors at low prices.

While observers think that lower client/server software prices may be in store, they are skeptical that deals such as Cincom's will save users money overall.

"They can give their engine away, but the cost of data conversion is where the real costs are. If they said they'd help you convert your system for a flat fee of, say, \$10,000, that's something to look at," said John Horner, business unit manager at systems integrator Scientific Applications International Corp.

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IBM

Continued from page 35

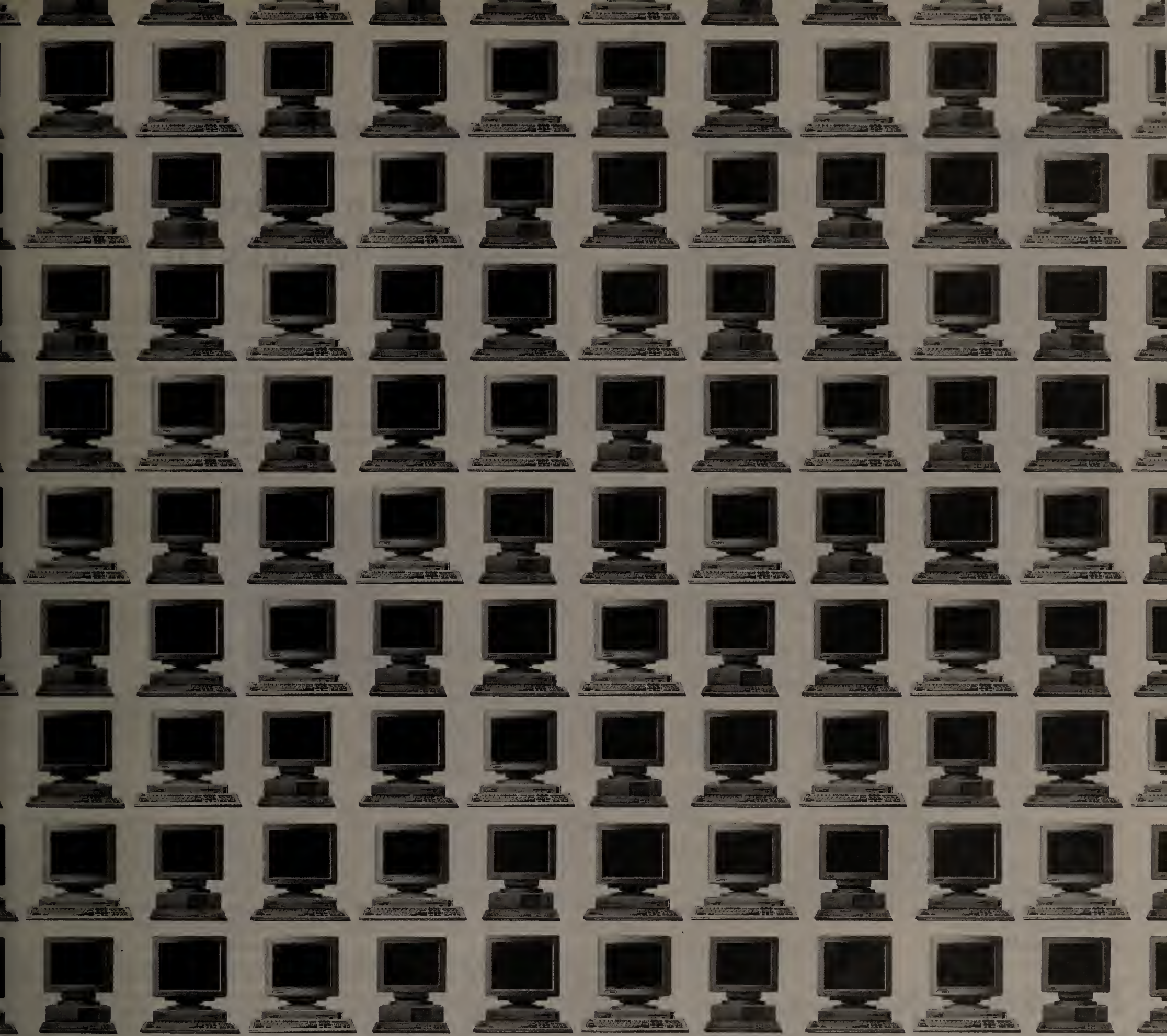
UltiMail is a client/server E-mail product that supports X.400 mail transport, Transmission Control Protocol/Internet Protocol and the Simple Mail Transport Protocol, as well as X.500 directory services.

UltiMail will also be able to use DB2/2 as a message store, which would make it more scalable, and add layers of security that its internal message store does not offer, IBM officials said.

IntelliAgent is a desktop organizer that lets users graphically build rules to manage events during their workdays. For example, users can graphically link their E-mail with several what-if situations so that if mail comes in from the boss, it can be routed to a special folder and IntelliAgent can page the recipient.

When it is integrated with UltiMail, the rules that users build into IntelliAgent on their desktops will reside on a server, so they can filter incoming mail before it arrives on their desktops. This will, among other things, let users who dial in for mail using a modem filter out mail with attachments too large to be downloaded over telephone lines.

IntelliAgent currently supports VIM and works with cc:Mail and Notes messages. It runs on OS/2 and the Application System/400 operating system, and IBM has announced plans to port it to AIX. □



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EDITORIAL

Sparring partners

Want a relatively cheap and easy way to boost the return on your network investments and round out your strategic plans? Take on a sparring partner.

I'm not talking about someone you can knock around to work out your aggressions. (Although an inflatable CFO would be a handy thing to have about the office on tough days.) I'm referring to another company with which you can share strategies and problems and get some advice and money-saving ideas.

Most of us don't network with peers in other companies because we're concerned about spilling proprietary information or we're afraid to break the ice. But opening the kimono with other users can be a powerful experience.

Consider Connecticut Mutual Life Insurance Co., which has established an international cadre of sparring partners.

The company is well known for its innovative reengineering and IS initiatives under the guidance of Janice Scites, president of Conn. Mutual Customer Services. (Among other things, Conn. Mutual has won *Network World's* User Excellence Award.) But one of the things that's impressed me most about the company is its aggressive efforts to establish ties with other users.

I talked to Scites about these cross-pollination efforts after reading a presentation on IS strategy that she gave to employees of a rival insurance firm.

"We look for companies that are willing to take risks and look at things differently," Scites said. "We discovered that we have the same problems but different solutions and quickly saw that we could save money."

Scites said there is little risk of giving away too much. The company won't divulge details of key development efforts, such as specific APIs, and it signs confidentiality agreements with sparring partners.

"The value of being open is much greater than withholding information. It keeps us from getting too far out, and it's great for staff morale," Scites said. "Most people are afraid to share their ideas, but we welcome feedback. That way, you don't get locked in when things are changing so fast."

The sparring partner program is just one of a number of unusual things Conn. Mutual does. For example, the firm has a vendor partnership program through which it has built highly effective supplier relationships. It's even got a newsletter that keeps vendors updated on the company's IS programs.

Want to start your own sparring partner program? Scites offered the following advice: Get to the meetings of industry or trade associations, track down peers from the companies you respect, and arrange an initial meeting to share philosophy and strategy. From there, map out future topics of discussion.

Or put your vendors to work setting things up. Use their contacts at innovative companies — particularly those in other industries.

Need any more incentive? Consider this from Scites: "I've gotten ideas that have saved us hundreds of thousands of dollars. You only need a few wins like that to make it all worth while."

♦ JOHN GALLANT

jgallant@world.std.com

TELETOONS FRANK AND TROISE

The Future Of Networking
May 4, 1996

Highly sophisticated second-generation caller I.D. services are offered by local RBHCs but reaction to them is mixed.



SPEAKING THE LANGUAGE

by Linda Musthaler

One step backward with Microsoft's OLE

There's an old cliché about taking two steps forward and one step back. This certainly applies to network technology today.

Take, for instance, the recent release of Microsoft Corp.'s Object Linking and Embedding (OLE) 2.0 for the Windows environment. Here is an evolutionary technology that is designed to pull us into the future world of object-oriented computing. What's more, OLE 2.0 promises to make the creation of compound documents easier than it ever has been before. Two steps forward.

But OLE — as well as other technologies that use objects, applications and data from multiple sources — can wreak havoc with your network traffic by conjuring up files and data from far-flung servers and workstations (June 27, page 1). One step back.

OLE is a dynamic linking technology that allows you to build a compound document using related documents and applications.

For instance, you might want to create a brief client proposal that includes text, graphics and some numerical analysis. You could create the document using a product like Microsoft Word. (In OLE parlance, Word is the container application — it holds all of the information from many sources.)

To add your graphics, you click on a graphic icon, which launches Microsoft PowerPoint from within Word. You then create a small pie chart and embed the chart into the master document. To add the numerical data, you click on the data icon, launching Excel. You whip up a spreadsheet and paste-link the data into the proposal document, so that when the spreadsheet data changes, the proposal automatically changes, too.

From a user's perspective, performing these activities sounds innocent enough. But the behind-the-scenes actions used to create this and other innocent compound documents could be eating up your network bandwidth and putting the squeeze on resources. You see, it's possible that each time a user launches another application or links another object, he generates a lot of traffic as application and data files are moved across the network to his workstation. What's more, the average user doesn't even realize what's happening in the background — nor should he care.

Microsoft readily admits that this is an inherent problem with using OLE 2.0 on a network today. However, the problem isn't limited to the use of OLE. This network congestion problem can occur when utilizing client/server technology, document management systems, electronic mail systems and even Windows itself. Basically, the congestion occurs any time you move large files around a network. Let's not single out OLE as the culprit.

In fact, the real problem isn't the applications we choose to use; it's the underlying infrastructure of the network. Let's face it, many of our existing networks were set up years ago to handle file and print sharing. They weren't designed for the complicated manipulation of objects and the simultaneous use of multiple applications across a network.

I personally think that OLE 2.0 offers some very worthwhile technology, and we shouldn't ban or

restrict its use because of excessive network traffic. (In the June 27 story, one consultant actually suggests that IS should "devise rules" about how files can be stored on networks and fire employees who violate those rules. How absurd! Would you fire the CFO because he linked his spreadsheet to files stored in the wrong place?)

If the thought of turning users loose with OLE's linking technology makes you nervous, then you better start looking for a resolution to the network congestion problem now. OLE is here to stay. It is a very strategic application for Microsoft and more than 250 other independent software vendors. If your organization uses Windows, then sooner or later your users and their applications will be OLE-enabled.

Moreover, there's really no practical (and available) alternative to OLE at this point. From a business perspective, OpenDoc is weak, and the Object Management Group's Common Object Request Broker Architecture is failing. Microsoft's competitors rant and rave about unfair competition, but the fact is that they have been ineffective in coming up with alternatives, while Microsoft is shipping product today.

So what's the answer? It certainly isn't in banning technology or firing people who inadvertently misuse it.

Rather than sticking your head in the sand to avoid the issue, I suggest you look at your network infrastructure and find ways to manage the traffic. Many networks that have enjoyed stellar performance for years are suddenly experiencing performance problems because today's rigorous applications are taxing the limits of the infrastructure.

If it has been a few years since your network's original design and implementation, it's time for a network review. First, take a look at your current (and near future) requirements. Users' needs have probably changed, and certainly their applications have changed in the past few years. You'll want to upgrade your network's capabilities to match the updated requirements.

When performance problems rear their ugly heads, you might try using a protocol analyzer to check out existing conditions on the network. If necessary, segment your network with smart hubs, bridges, routers, switches and the like to improve traffic flow.

You also might find that it's time for an upgrade in server memory or disk capacity.

In the case of OLE, it might be necessary to look at where data and applications are located. When possible, put applications where they are most commonly used — often at the user's desktop. Check out the new systems management tools to help you monitor and control what's happening at the desktop.

In short, the solution to the network logjam is not to ban OLE and other worthwhile applications. The solution is to address the underlying cause of the problem. Then, maybe instead of two steps forward and one step back, you can leap ahead three steps.

♦ Musthaler is vice president of research at Currid & Co., a Houston-based technology consulting firm. She can be reached at (713) 789-5995.



by Don Helms

Why users need physical collocation

Network managers who've ever benefited from having a choice of local telecommunications carriers should circle Sept. 1 on their calendars. That's the date when the local telephone companies will tell the Federal Communications Commission how they will interconnect competitive local carriers to their networks with virtual collocation.

The terms virtual and physical collocation refer to the different arrangements by which local carriers can connect into the ubiquitous, local monopoly telephone network. By offering interconnections that are "technically and economically comparable to actual physical collocation," a standard set by the New York Public Service Commission (NYPSC) in 1989, the local telephone monopolies can demonstrate the truth behind their claimed support for local telecommunications competition. Their decisions will determine whether network managers will have more or fewer choices when it comes to competitive, local telecommunications carriers.

Teleport Communications Group's (TCG) experience with New York Telephone Co. in implementing virtual collocation offers a lesson on how collocation can be achieved — as well as a warning on the possible consequences for local telephone companies that attempt to "game the process."

In 1989, the NYPSC ruled that New York Telephone, which rejected earlier TCG requests for interconnection, had to supply TCG with a virtual collocation interconnection. It was the first time in the nation that a state regula-

tory agency forced a local telephone company to provide interconnection.

Here's how TCG's first virtual collocation arrangement with New York Telephone worked. TCG bought fiber-optic equipment and sold it to the local phone company for \$1 on the condition that TCG could repurchase it for \$1. New York Telephone placed the equipment in its central office. TCG then paid New York Telephone for the central office space and equipment maintenance, including repairs.

Because we at TCG couldn't have direct access to our equipment, problems quickly ensued. We couldn't respond fast enough to customer problems. We were hampered in getting service up and running for customers. Delays occurred in identifying network difficulties. We couldn't get network monitoring equipment installed.

Ultimately, New York Telephone agreed that the situation was intolerable. It went back to the drawing board and came up with the replacement arrangement for virtual collocation: physical collocation that is still in service today. New York Telephone learned from experience that physical collocation is more efficient for both the local monopoly and the competitor because it ultimately offers customers better quality, service and prices.

Physical collocation was originally required two years ago by the FCC in an attempt to encourage local competition. However, several regional Bell holding companies challenged the ruling in the courts, and in June, a U.S. Circuit Court of Appeals ordered the FCC to revise its collocation

rules. The FCC complied and required local telephone monopolies to provide only virtual collocation.

New York Telephone has already said that it will continue to offer physical collocation, despite the FCC's revised ruling. Hopefully, the remaining local monopolies will draw the same conclusions and avoid the troubles that virtual collocation can bring if not properly executed.

However, if the local telephone monopolies choose virtual collocation, they should bear in mind the NYPSC's 1989 ruling that "the interconnection must be technically and economically comparable to actual collocation, and the terms must be reasonable." That guide should keep prices reasonable and maintain responsive customer service.

If the local telephone companies subscribe to local competition, network managers will see an expansion of their choices and an increase in competitive local carriers. If not, net managers will see the down side: less competition, unreasonable costs, poor maintenance, poor service and slow repair. Then virtual collocation will be seen as a clear effort by the local phone companies to inhibit competition and abuse their bottleneck monopolies.

One has only to look at history to see that the 1984 divestiture of AT&T was spurred by such tactics. If the remaining local telephone monopolies can learn from history, there won't be a need for further divestiture or the risk of anti-competitive litigation.

♦ Helms is vice president of network engineering for Teleport Communications Group, Inc., a competitive access provider in New York. He can be reached at corrington@aol.com.



Letters

Get your CIX

I find it highly interesting that the article about the secret vote by the Commercial Internet Exchange (CIX) board to demand a \$10,000 membership fee from resellers (July 25, page 1) was in the same issue as the editorial about the Justice Department/Microsoft Corp. anti-trust settlement (July 25, page 44).

The CIX move would appear to have a significant adverse impact on smaller resellers and groups of small businesses attempting to combine their connection needs in order to justify the cost of bringing a high-speed connection into a particular geographic area.

Ultimately, the CIX group may well find themselves rendered irrelevant by the proliferation of small IP providers with the ability to route traffic around the CIX members. In the interim, perhaps the Justice

Department should pay a visit to the CIX group's next meeting.

Rob Marlowe
System operator
The Inner Sanctum BBS
New Port Richey, Fla.

Column kudos

I really enjoyed Art Barber's column "Who's going to pay for the NII?" (July 25, page 45).

I would like to extend my kudos to Mr. Barber by E-mail. Would it be possible to obtain his E-mail address?

Bob Becnel
Electrical engineer
Zurheide-Herrmann, Inc.
St. Louis

Editor's response: Currently Mr. Barber is not on an E-mail system. However, you can call him at (301) 320-4333.

Free at last?

In your article "Microsoft free at last?" (July 25, page 4), Frank Caro of Otis Elevator Co. commented on

the common theme to Microsoft networking: NETBIOS. He's right. Microsoft has always had a chemical dependence on NETBIOS and NETBEUI.

Discussions of NETBIOS can be confusing because it is actually two things: a set of application program interfaces (API) and an on-the-wire protocol. NETBIOS supports a set of APIs defined in the Internet Engineering Task Force RFCs 1001 and 1002.

Another common extension to NETBIOS is Server Message Block (SMB), which is the real additive agent and contains the "keys to the kingdom" of Microsoft networking.

Microsoft networking still uses, depends on and makes calls to components of NETBIOS, its APIs and SMB, even when the underlying transport protocol is TCP/IP or Internet Protocol Exchange/Sequenced Packet Exchange (IPX/SPX). I have tried to completely disable NETBIOS and use purely TCP/IP or IPX/SPX and have found that certain features no longer work.

Also, Microsoft networking still

appears to be inextricably tied to NETBIOS naming conventions — which is the real debilitator.

Regarding Chicago's native support of TCP/IP — it will be the same. I do not know this for a fact, but it seems to me that backward compatibility is paramount.

To change the way it uses TCP/IP, and more importantly, the higher APIs, would render the new operating system noninteroperable with its predecessors. Not a smart move.

Novell also offers native TCP/IP support — NetWare/IP. Instead of using Novell's IPX/SPX as a transport protocol for NetWare Core Protocol (NCP), TCP/IP can be used. The Service Advertising Protocol (SAP) functions are handled differently, as are other NetWare functions, but now NetWare can be handled natively over an IP-only internetwork (not encapsulated or tunneled).

In your article, Nick Lippis, principal at Strategic Networks Consulting, Inc. asked, if the desktop operating system supported

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Review

ATM switches live up to *hype*

Despite a few glitches, this group of ATM switches proves adept at addressing the demands of high-speed enterprise nets.

ATM switches have certainly been receiving their share of attention lately as both vendors and users tout their strategic value to enterprise networks. But just how well do these switches perform? And do they live up to all the hype?

In this review — our second in a continuing series — we attempted to answer these questions. In conjunction with the International Communications Association (ICA) program held at the University of Colorado at Boulder, we invited a whole slew of Asynchronous Transfer Mode switch vendors to participate in our tests. Only four vendors answered our call, however.



Fore Systems, Inc. provided us with a switch targeted at LAN applications — the recently announced ASX-200. The company also provided us with the ASX-100 — also a workgroup class switch. Fore Systems, incidentally, was the only ATM switch vendor to answer our first call to test earlier this year.

GTE Government Systems Corp., General DataComm, Inc. and Newbridge Networks, Inc. provided larger switches designed for backbones and their heavier traffic loads — the SPANet 155 Central Office Rack Mount Switch, the APEX DV-2 and the 36150 MainStreet, respectively. These are large ATM switches ranging in class from enterprise backbone switches to central office switches.

Many vendors expressed interest in the ICA testing program but did not provide us with switches for testing. Network Equipment Technology, SynOptics Communications, Inc., Digital Equipment Corp., Hughes LAN Systems, Northern Telecom, Inc. and Hitachi, Ltd. fell into this category. Digital did, however, lend us several ATM-works 750 Turbochannel Workstation adapters for our tests. We also invited Cabletron and AT&T's private branch exchange division, but they did not have products available when we conducted our reviews. Lightstream Corp. pulled out two weeks before testing began, while AT&T Network Systems, Siemens/Stromberg-Carlson and Fujitsu Busi-

ness Communications Systems didn't commit switches. But Fujitsu provided an SMX-6000 Service Multiplexer.

All of the switches we tested performed well, though we did encounter some bugs that still need to be worked out. For instance, we found that we were unable to exceed a 21% aggregate switching load on the APEX DV-2 switch and we could not get MainStreet's point-to-multipoint capability to work in our lab due to a bug in our unit's controller card.

But performance numbers are only one piece of the ATM puzzle. Not all ATM switches are identical. In fact, different switches serve different needs. You should look at performance benchmarks, but keep in mind the type of applications for which specific brand switches were designed. Some may be used as workgroup hubs.

Others can be used in the backbone to provide access to telephone company central offices. You also would be wise to select the switches that offer the cell-bearing interfaces — DS3, Optical Carrier (OC)-3 and the Transparent Asynchronous Transmitter/Receiver Interface (TAXI) — and features your site requires. You will also want to examine ease of use, administration and maintenance issues. And, of course, there is the issue of standards. Two of the switches we examined, the ASX-200 and the GTE SPANet, can interoperate, but more standardization is needed.

All of these switches require management identification and authentication for logging into the system. Optional modems may be employed for remote dial-in and password-initiated callback. Each switch also supports the Simple Network Management Protocol. In fact, they all offer graphical user interfaces (GUI) to standard SNMP and Management Information Base (MIB) functions.

Hot-swappable capabilities are also common features. This means that plug-in modules and cards, such as line interfaces, power supplies, switch control cards and clock cards, can be replaced without powering down the switch. On highly redundant machines, severe failures can be handled without any service loss.

We also noticed that the lack of a network-to-network interface (NNI) specification has forced vendors to implement their own proprietary NNI, leading to interoperability problems. Each vendor defines Virtual Path Identifier/Virtual Circuit Identifier (VPI/VCI) pairs and message formats and contents for meta-signaling. If you need switches that interoperate, you must make sure the switches don't require proprietary VPIs and VCIs. This lack of an NNI standard is a concern to the ATM Forum, which expects to release an NNI Phase 0 specification next month and a Phase 1 specification in March. Switch vendors have pledged support for these specifications but continue promoting their own private NNI versions.

Before taking a look at the test results, we've mapped out some of our experiences with the products we tested.

FORE SYSTEMS

We tested two switches from Fore Systems — the ASX-200 and the ASX-100. **Continued on page 44**

NET Result

Product	ASX-200	APEX DV-2	SPANet 155	36150 MainStreet
Key findings	► Suitable for workgroup and backbone applications. ► Posted the lowest delay times for OC-3 interfaces. ► Provides bandwidth policing. ► Point-to-multipoint capability did not work in our test environment.	► Targeted at backbone applications. ► Has redundant load sharing power supplies. ► Provides bandwidth policing. ► A bug prevented the switch from handling more than a 21% aggregate switch load.	► Designed for large backbone and central office applications. ► Does not offer bandwidth policing. ► Rated for harsh environments. ► Can be configured with multiple levels of redundancy.	► The easiest switch to set up and configure. ► Rated for harsh environments. ► Does not offer bandwidth policing.
Vendor	Fore Systems, Inc. 174 Thorn Hill Rd. Warrendale, Pa. 15086-7536 (412) 772-6600	General DataComm, Inc. 1579 Straits Turnpike P.O. Box 1299 Middlebury, Conn. 06762-1299 (203) 574-1118	GTE Government Systems Corp. 77 RAS St. Needham, Mass. 02194-2892 (800) 982-0381	Newbridge Networks, Inc. 593 Herndon Parkway Herndon, Va. 22070-5241 (703) 834-3600

By STAN BUSH, BOB CRUICKSHANK, RUSS SIRACUSE & BOB WALD

Continued from page 43

100 and the ASX-200. They are targeted at workgroup applications, but may be used for backbone hub applications, as well. The products are housed in a pizza box-sized unit that stands 5 inches tall. Because we received the ASX-200 late in the test process, we ran our long-term performance tests on the ASX-100 and the short-term tests on the ASX-200.

Mean transport delay (DS3 interface)		
Bandwidth utilization	0% switch load (microsec)	50% switch load (microsec)
ASX-200		
25%	40.04	39.55
50%	39.54	39.14
75%	42.62	41.94
100%	44.70	50.88
APEX DV-2		
25%	38.20	NA
50%	37.99	NA
75%	39.38	NA
100%	48.51	NA
SPANet		
25%	62.67	63.30
50%	65.98	64.56
75%	67.66	68.41
100%	71.31	67.06
36150 MainStreet		
25%	40.32	44.06
50%	38.89	44.06
75%	48.03	43.93
100%	47.18	43.96

NA = Not applicable

Both switches are built around a time-division multiplexed bus with four switch fabric ports, each running at a speed of 622M bit/sec, providing an aggregate, nonblocking switching capacity of 2.5G bit/sec. Depending on the mix of interfaces chosen, the ASX-200 may be configured with as many as 24 ports.

The ASX-200, like the ASX-100, uses ATM in-band signaling, the proprietary SPANS protocol, to set up switched virtual circuits (SVC). The ASX family supports the user-to-network interface (UNI) and NNI for permanent virtual circuits (PVC) and SVCs. The ASX-200 fully supports the UNI 3.0 specification and partially supports the UNI 3.1 specification.

The ASX family supports two traffic priority levels to enforce quality of service (QoS). Per-call security levels have not been implemented in either switch, but dual leaky buckets are standard on the ASX-200. That means each output port has two 256-cell buffers. Faulty link reroute is standard, while bandwidth policing is a new feature that was not available on the ASX-100. In addition, the ASX-200 supports use of the generic flow control (GFC) field, which detects congestion and alerts recipients. Billing capabilities, which were not available on the ASX-100, are supported on the ASX-200. Sites that require redundant load-sharing power supplies should look at the BX, BXE and WANswitch versions of the ASX-200.

GTE GOVERNMENT SYSTEMS

The GTE SPANet switch family has been designed for large backbone nets and central office access markets. They are available in single rack, nonredundant or multiple rack, fully redundant configurations. We tested the top-of-the-line, fully redundant SPANet 155 Central Office Rack Mount Switch, which also can be used in large private backbone nets.

An agreement with GTE gives Northern Telecom the rights to market the SPANet under

the NTI Magellan Gateway label. GTE has implemented Fore Systems' SPANS protocol and can interoperate with other switches and adapter cards that use the SPANS protocol.

The switch fabric architecture is a fully interconnected matrix that provides multicasting and broadcasting capabilities with latencies matching point-to-point transfers. A 10-level priority system enforces QoS by discarding cells during periods of contention. It supports the user-to-network interface for PVCs and SVCs. SVCs are set up with the Fore Systems' SPANS protocol.

There are eight switch fabric ports, each operating at 155M bit/sec, providing an aggregate switching capacity of 1.2G bit/sec. Depending on the selected interfaces, the maximum number of I/O ports ranges from eight to 32. For Release 3, each port has a single 240-cell output buffer. Release 4, the switch that we tested, offers larger, dual-queue storage capability in the switch fabric to minimize cell loss and packet retransmissions when handling bursty variable bit rate (VBR) traffic, which is often found in Transmission Control Protocol/Internet Protocol environments. Each switch fabric port is equipped with two buffers — a 240-cell buffer for constant bit rate (CBR) traffic and either a 4,000 or an 8,000-cell buffer for VBR traffic. Expedited service is given to the CBR buffer, assuring low latencies and cell-loss ratios. The end result is higher overall bandwidth utilization.

A GUI is used to configure the switch, bring it to an operational state and administer switch connections. A script recording, editing and playback tool greatly simplifies repetitive tasks. Another tool, SPANet Network Manager, lets you administer several networked switches. Billing information is collected on a per-port basis in Release 4 and can be uploaded or stored on a removable 525M-byte hard disk or transferred via X.25.

The SPANet may be configured with one or two host processors. When two processors are used, the second remains in an active standby state, assuming control of the switch in the event the primary processor fails. The switch fabric also may be duplicated. There is a delay of less than 10 microsec during the switch-over. The switch core nest and processor power supply and system clock may also be duplicated for similar functionality. No service, traffic or routing information is lost during switch-over to these backup components.

SPANet can operate in harsh environments and is rated for use in Seismic Zone 4 (6.6 on the Richter scale). It has an availability of 99.9996% when installed with all redundant features. The fully redundant version is enclosed in a 7-foot-high cabinet.

GENERAL DATACOMM

The APEX DV-2 employs an enhanced broadcast matrix switch architecture. This design offers full-bandwidth interconnections, enabling nonblocking operation between line interface modules. The Generation 2 switch has been optimized to provide multicast support with no increase in latency times and no degradation of latency times. It's available with either a 3.2G or 6.4G bit/sec aggregate switching capacity. The switch fabric supports 16 ports, each operating at 200M bit/sec (Generation 1) or 400M bit/sec (Generation 2). Depending on the interfaces used, the maximum number of ports ranges from 16 to 64.

Like all of the switches that we tested, the APEX DV-2 supports SNMP, but it may also be managed from a serially-connected terminal.

The APEX DV-2 has redundant load-sharing power supplies and a distributed internal clock. The switch processor may be duplicated for increased reliability. Each line interface module supplies up to four I/O ports. SVCs are supported in the Generation 2 switch, but not in the Generation 1 switch we tested.

The APEX DV-2 supports four traffic priority levels — CBR, VBR high, VBR medium and VBR low. Generation 1 hardware has a 32-cell output buffer per port. Generation 2 provides a 64-cell output buffer for high-priority traffic and 1,100 cell output buffer for low-priority traffic. Distinguishing itself from all other switches we tested, the APEX DV-2 has key-operated, secured management access for two separate serial connections. Security levels are not implemented, but the switch offers a bandwidth policing capability. Billing is not offered on Generation 1, but is on Generation 2.

Up to four leaky buckets are available for the Generation 1, and four leaky buckets are standard on Generation 2. Faulty link detection is provided by the NMS-3000 software, which monitors the MIB. A call recording feature is a superset of the standard MIB. The GFC is not used.

NEWBRIDGE NETWORKS

Newbridge's 36150 MainStreet is available with four, six, eight or 16 ports and serves backbone hub and central office applications. The switch that we tested had eight switch fabric ports each running at a speed of 155M bit/sec for an aggregate switching capacity of 1.2G bit/sec. Currently, all I/O interfaces have one port per card, but multiport I/O interfaces are planned for Release 3.

The switch fabric is a three-stage architecture; each stage is comprised of four port-switching modules. In Release 1, the output buffer architecture has one 16-cell buffer for each of the four input ports. In Release 2, the individual buffers hold 74 cells.

Switch administration is straightforward. In fact, MainStreet was the easiest to set up and configure, largely because it has few parameters that need to be manually set. The optional 4602 Network Manager System operates on a Sun Microsystems, Inc. platform and facili-

tates both switch and net management functions. A Hewlett-Packard Co. OpenView version of the network manager system will be out early next year. Seven layers of management logons are supported with each layer, having specific permissions for administration tasks.

Redundancy may be added to the switch control, switch fabric and power sections by adding plug-in modules. Adding a duplicated switching fabric ensures that existing switched paths are maintained in the event of primary fabric failure — though, as expected, cells are momentarily lost during transition to the standby switching fabric. As many as three load-sharing power supplies provide redundant switch power and can be wired to separate AC or DC power feeds.

Mean transport delay (TAXI interface)		
Bandwidth utilization	0% switch load (microsec)	50% switch load (microsec)
ASX-200		
25%	6.33	6.33
50%	6.33	6.33
75%	6.39	6.39
98%	11.65	10.64
APEX DV-2		
25%	13.32	15.91
50%	13.32	16.17
75%	13.38	44.12
98%	16.10	161.47
SPANet		
25%	19.10	19.11
50%	19.10	19.08
75%	19.78	19.78
98%	25.18	24.80

NA = Not applicable

MainStreet is also suitable for less-than-hospitable environments. It's undergone testing in earthquake environments and its availability is rated at 99.99%.

The Release 2 switch we tested provides full support of UNI 3.0 and partial support of UNI 3.1. It supports all possible VPI/VCI pairs. According to Newbridge, the next release, Release 3, will fully support UNI 3.1 as well as forthcoming NNI specifications. The SPANS protocol is not supported. Release 1 of MainStreet partially supports the UNI 3.0 specification, by providing PVCs and point-to-multipoint connections. SVC support will be added in Release 3, which is due by year end.

HOW WE did it

For our tests, we relied on equipment from several manufacturers. Hewlett-Packard Co. provided the HP Broadband Series Test System, HP 75000 Series 90 Modular Telecom Analyzer and the hand-held HP/Dsknet DS3 tester (also available in OC-3). Siemens AG provided the ATM Analyzer K4501. Telecommunications Techniques, Inc. supplied the T-Berd 310 used for physical-layer DS3 and SONET verification, and we used an Adtech four-port ATM Load Generator to load the switches through four parallel OC-3 traffic streams.

Fujitsu Business Communications Systems provided the SMX-6000, an ATM service multiplexer that converts DS3 native mode traffic to OC-3 ATM cell-based SONET traffic. Astarte provided two fiber-optic Star Switches for optical interconnection of OC-3 transmission paths. Fiber Optic Technologies provided 40 mixed single mode and multimode fiber-optic patch cables for interconnecting optical equipment. Sun Microsystems, Inc. provided a SPARC Classic and two Sun SPARC 10 workstations for switch administration and file-transfer applications. We also used two Digital Equipment Corp. ATMworks 750 Turbochannel workstation adapter cards for our file-transfer application. The National Telecommunications and Information Administration provided several pieces of equipment that we used in our ATM videoconferencing trial.

Desktops bog down ATM nets

We wanted to learn about the potential issues of running ATM to the desktop, so we created a file-transfer and videoconferencing application to measure its effects.

We found that Asynchronous Transfer Mode provides the ability to scale upward as bandwidth requirements increase — something Ethernets and switched Ethernets can't do. But ATM to the desktop does introduce some interesting network issues.

For the workstation file-transfer application, we took two similarly configured Sun Microsystems, Inc. SPARC 10 workstations and outfitted them with Fore Systems, Inc. SBA-200 ATM TAXI interfaces. Communications through an ASX-100 was established using the SPANS protocol to establish a switched virtual circuit between the workstations. We also established two alternate non-ATM communications paths between the workstations: a standard 10Base-T Ethernet bus connection and a 10Base-T switched Ethernet connection.

Separately, we configured two Digital Equipment Corp. Alpha workstations — an AXP 3000-600 and an AXP 3000-800 — with ATMworks 750 TURBOchannel adapter Optical Carrier (OC)-3 interfaces. We performed cp, udp and rr file transfers on both the Sun and Digital platforms.

We learned that with a high-performance network such as that provided by ATM TAXI and OC-3 interfaces, the bottleneck in file transfers shifts from the network to the workstations, which often can't keep up with the network's speed.

To compensate, transmit data should be random-access memory-based since disk transfer rates won't be fast enough to utilize the network. Also, net parameters, such as the Transmission Control Protocol sliding window size, and I/O buffers, will have to be tuned to optimize the net for ATM.

ATM is also suitable for videoconferencing applications. In our test, we connected the switch via an ATM OC-3 to a service multiplexer which, in turn, was connected to two multimedia personal computers (a T-3 link through a data service unit/channel service unit and then through a T-1 link to each PC).

First, we found that real-time voice/video applications can be combined over a single LAN/WAN infrastructure involving mixed ATM, T-3 and T-1 facilities. We also found that errors injected into ATM cells can cause synchronization errors, thus freezing video or distorting images.

To create a video application over ATM, we passed a color video camera's National Television Standards Council (NTSC) output directly to a Newbridge Networks, Inc. 36150 MainStreet JPEG video card. The switch then routed the traffic through another video card to a video quality measurement system and a video projector. From our tests, we concluded that ATM is a suitable technology for video transmission but that there are a few issues with which users should be aware. NTSC full-motion video, for instance, may be JPEG-compressed, but high compression can result in poor image quality and greater sensitivity to errors.

In Release 2, QoS is enforced by two traffic priority levels and a variable number of dual leaky buckets. Release 2 also provides bandwidth policing for all interfaces. Release 1, in contrast, polices native mode interfaces. Faulty link detection and management is handled through the 4602 network management system, which queries the MIB. Using MIB statistics collected every 15 minutes the Main-Street also provides billing capability. The generic flow control field is not used.

ON WITH THE TEST

We designed tests to investigate the short-

term performance and the longer term reliability of these switches. We measured cell header and payload bit errors, cell loss and out-of-sequence cells, factors that affect the overall performance of these switches in any environment. We measured single port-to-single port performance, as well as point-to-multipoint. We ran these tests under 0% and 50% loads.

Our first set of tests focused on the long-term (12-hour) performance of the OC-3 interface. We chose OC-3 because of its high bandwidth, which puts a greater load on the switching fabric. We transmitted a periodic repeating stream of 22,000 unique cells at the

maximum subscription rate for 12 hours. We used a pseudo-random binary sequence of order 23 (PRBS23) to create the unique cell stream. The periodic PRBS23 cell stream was transmitted to the switch at the maximum subscription rate for the 12-hour period.

The bandwidth of the Synchronous Optical Network (SONET) OC-3 interface is 155.52M bit/sec. After subtracting the SONET and ATM overhead, the maximum payload bit rate is 135.63M bit/sec. In the 12-hour test period, we transmitted 6.47 trillion bits in 15.3 gigacells — 610.3 gigabits occupied cell headers while

Continued on page 46

Version 3.1

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Communications/3270

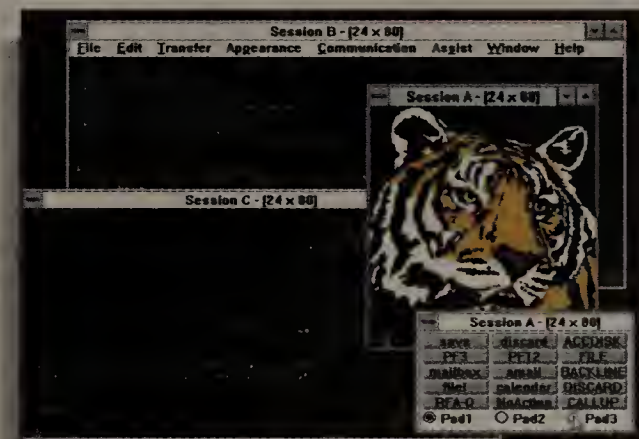
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Continued from page 45

5.86 trillion bits occupied cell payloads.

All of the switches performed well. None of them returned cell headers with two or more bit errors. In fact, none of the switches returned cell headers with one bit error. The header bit error rate for the first and second tests is less than one in 610 billion bits. For most of the switches, we also didn't detect any cell loss, equating to a cell bit error rate of less than one in 6.47 trillion bits. But the APEX DV-2 lost four cells yielding a cell bit error rate equal to 1696 (four cells x 53 bytes/cell x 8 bits/byte) in 6.47 trillion bits or one in 26.2 billion bits. We suspect that this higher cell loss was due to other, higher priority traffic, such as a switch management message, that momentarily prevented the test stream from using all of the available bandwidth.

Mean transport delay (OC-3 interface)		
Bandwidth utilization	0% switch load (microsec)	50% switch load (microsec)
ASX-200		
25%	11.32	11.86
50%	11.33	11.88
75%	11.33	12.27
100%	14.15	13.59
APEX DV-2		
25%	16.66	NA
50%	16.66	NA
75%	16.65	NA
100%	19.49	NA
SPANet		
25%	25.55	25.65
50%	25.50	25.57
75%	24.85	25.67
100%	29.97	30.46
36150 MainStreet		
25%	18.91	20.93
50%	19.15	22.13
75%	21.15	20.04
100%	26.44	25.84
NA = Not applicable		

In the fourth test, no out-of-sequence cells were received by the switches corresponding to cell sequence error rate less than one in 15.3 billion cells. In the fifth and final long-term test, no cell payload bit errors were noted from the switches corresponding to a cell payload bit error rate of less than one in 5.86 trillion bits.

Next, we examined the short-term performance of the switches. We measured cell losses, transport delay and interarrival times. We also looked at cell error handling, cell bandwidth policing and point-to-multipoint transmissions. For each test, we transmitted 1,500 cells from the tester to the switch, which then routed cells back to the tester.

Cell delay is a measure of how long it takes a cell to travel through a switch. As the maximum subscription rate is approached, some cells may be put in buffers, thus increasing the delay by an integer multiple of the time required to transmit a cell (2.7 to 3.2 microseconds for a cell transmitted over OC-3). Cell interarrival is a measure of how much time has passed between the arrival of cells. It is based on the difference between time stamps in successive cells. As the maximum subscription rate is reached the interarrival times asymptotically approach the time required to transmit a cell.

In the first short-term test, we simulated a no-load environment. We made sure there were no PVC or SVC calls on the switch and then configured the switch for one bidirectional PVC — our test call. We began transmitting cells at 25% of the allowable bandwidth (25% of the maximum subscription rate) and monitored cell loss, cell transport delay and cell interarrival times as we increased band-

width to 100%. We then repeated the test under a 50% aggregate switching capacity load.

During our testing, we discovered a bug in the APEX DV-2 that prevented us from exceeding a 21% load on the switch. General DataComm is aware of the problem and is working to correct it. But in the no-load environment, the APEX DV-2 exhibited the shortest average delay, 38 microsec. MainStreet had the least delay, 44 microsec, under the 50% load. In general, we found that delay times climbed as we increased the switch load and the bandwidth demands, forcing the switches to work harder.

The time interval between cells received is the interarrival time. We used an HP Broadband Series tester to generate a periodic stream of data cells and blank cells for desired bandwidth levels. For example, at 50% bandwidth (subscription rate), the tester generated a periodic data-blank-data-blank cell stream. The APEX DV-2 retranslated the exact data-blank-data-blank sequence while others retranslated non-exact data-data-blank-blank-data-blank stream. This unclustered transmission of data cells is desirable because it lessens the need for downstream buffers when, for example, the communications path must cross several networked switches.

The average time was the same for all switches at any bandwidth. For an unloaded switch with a cell stream using 25% of the available bandwidth, interarrival time was approximately 41.67 microsec. When we upped the stream to 100% bandwidth, the time fell to approximately 10.42 microsec. This is because a fixed number of cells must arrive in a specified time interval to get the desired bandwidth. As the bandwidth utilization approaches 100%, each of the switch's interarrival times approach the same minimum because the interface is running at the maximum subscription rate. Data is transmitted in all cells without any blank cells. The ASX-200 exhibited the shortest transport delay and best periodic transmission characteristics under unloaded and loaded switch fabric conditions.

We were unable to measure delay and interarrival measurements for the 36150 MainStreet TAXI interface because of a suspected incompatibility with its implementation of UNI 3.0. The ATM UNI Specification version 3.0, Section 2.3.2.2 states: "There must be a minimum of 1 JK symbol pair transmitted on the link every 0.5 second." The Newbridge 36150 MainStreet conforms to this specification by requiring a JK symbol pair before every data cell, which results in a proliferation of JK symbols — thus decreasing the available bandwidth to 98% of the maximum subscription rate. The HP tester, on the other hand, conforms to this specification in the strictest sense and was unable to communicate with the 36150 over the TAXI interface. All other vendors were able to receive data from the HP tester, providing a JK symbol pair every 0.5 second, though each defaulted to returning a JK symbol pair before each retranslated data cell. The GTE SPANet switch provides an option for transmitting TAXI data using either data coding scheme.

The ASX-200 was the best performer in the delay measurements using the OC-3 interface. Its delay times were approximately 11 to 14 microsec. The shortest delay times for the TAXI interface, which runs at a slower rate than OC-3, were 6 to 8 microsec.

The TAXI interface shows better performance (meaning shorter delays) than the faster OC-3 interface because it is a native cell-bearing interface that provides direct access to raw ATM cells (see story, page 46). In contrast, with

It's faster to take a TAXI

One question early ATM adopters may wrestle with is why the TAXI interface exhibits shorter delays than the faster OC-3 interface.

The reason is that the TAXI interface is a native cell-bearing interface providing direct access to raw ATM cells, whereas over the Optical Carrier-3 interface, ATM cells must be segmented into and reassembled from Synchronous Optical Network (SONET) frames. This extra work that must be performed by the SONET interface decreases its performance, producing longer cell switching delays.

Our testing determined that the General DataComm, Inc. APEX-DV2 was the best performer in the interarrival category. Cell interarrival is a measure of how much time has passed between the arrival of cells. A bug we found in the APEX-DV2 OC-3 interface affected us one last time during OC-3 tests; we found that when we established a new permanent virtual circuit (PVC) through the OC-3 interface, it allowed the switch to drop cells on an already existing OC-3 PVC. At 100% bandwidth, we lost about 36 to 40 ATM cells.

the OC-3 interface, ATM cells must be segmented into SONET frames and reassembled. This extra work results in longer cell switching delays. The aforementioned bug in the APEX DV-2 OC-3 interface affected us one last time. When we established a new PVC through the OC-3 interface, cells were lost on an already existing OC-3 PVC. At 100% bandwidth, this loss was approximately 36 to 40 ATM cells, which we believe was an anomaly caused by a bug in the product.

In the next of the series of short-term tests, we looked at the switches' abilities to handle errors in the cell stream. We quantified the impact of errors on switch operation. In compliance with ATM standards, switches should be able to identify and correct single bit errors in ATM cell headers by using the error detecting and correcting capability of the header check sequence. Cells with headers containing two or more errors cannot be recovered and should be discarded. We used the tester to periodically introduce bit errors in ATM cell headers of the transmitted data stream. When just one bit error was introduced, all switches were able to correct the error and to return error-free cells. When we introduced two errors in cell headers, all of the switches discarded the problem cells. The alarm reporting scheme for these types of errors varied among switches.

Next, we looked at the policing capabilities of the ATM switches. We found that only the ASX-200 and APEX DV-2 had functioning policing capabilities. These switches were able to police traffic and take action on cells that exceeded the bandwidth of a PVC. For example, we used the tester to create traffic at 60% of the bandwidth, thus providing 10% of traffic in excess of the 50% mean cell rate established on the switch for the PVC. Depending on the specified class of service (and corresponding QoS), the excess data may be discarded, or tagged. Given a certain class of service, any data above the mean cell rate with the Cell Loss Priority (CLP) bit set to 1 is discarded, and any data above the mean cell rate with the CLP bit set to 0 is retranslated in cases of no congestion, but will have the CLP bit reset to 1 so that downstream switches can discard the data if congestion exists. As expected, other classes of service implement different policing rules.

During testing of policing capabilities, we encountered a bug with the ASX-200 switch. It actually dropped cells when it was supposed to tag them and, interestingly, it tagged them when it was supposed to drop them. When we notified Fore Systems, they fixed the problem.

THE ENVELOPE, PLEASE

Pricing for these switches ranges. The ASX-200 starts at \$21,950, while the ASX-100 starts

at \$27,590. The GTE SPANet has a base price of \$75,000, but costs as much as \$300,000 for additional features and capabilities, such as redundancy. The APEX DV-2 costs approximately \$79,500 for an eight-port switch — two single-mode OC-3, two multimode OC-3, two TAXI and two DS3 ports.

Newbridge balked at our request for pricing, saying that it depends on the network and switch configuration. We then asked for pricing for a specific configurations, but Newbridge again declined to respond.

All of these switches performed well, though we ran into a few glitches. Only the GTE SPANet ran smoothly on all of our tests, exhibiting no problems. Despite the problems we encountered — and some were significant — these switches still demonstrate ATM's potential. Though still in their early stages of acceptance, ATM switches show signs that they can address the needs of high-speed enterprise networks.

But ATM is more than just a backbone technology. Our findings also indicate that ATM is suitable for the desktop, as well. It is more scalable than Ethernet and switched Ethernet and can be used for multimedia applications, such as videoconferencing.

New technologies bring new issues, however. As ATM extends to the desktop, network bottlenecks will dissipate, but workstation delays will increase because they will be unable to keep up with the higher speed network connections. As these issues arise, network managers will be called on to work with end users to develop strategies for taking full advantage of ATM.

◆ Bush, Cruickshank, Wald and Siracuse are members of the Interdisciplinary Telecommunications Program at the University of Colorado at Boulder and members of the Network World Test Alliance.

Syed Umar, Brian Riley, Tim Johnson and Neill Cameron also contributed to this review.

Get Focus-ed on ATM

In conjunction with *Network World*, market researcher Focus Data, Inc. is conducting a broad-based study of user requirements for Asynchronous Transfer Mode (ATM) products and services. The report will examine user concerns about ATM and alternative technologies, and explore corporate purchasing strategies. For more information on the study, which will be featured in an upcoming issue of *NW*, contact Mona Dabbon of Focus Data at (508) 626-2556.

Letters

Continued from page 41

TCP/IP directly, "Why continue with IPX?" Because it's easier. IPX gets bad press about its use of SAP broadcasts and the characteristic response frame required after every frame. The former can be controlled via SAP filters, available on most routers, and the latter is no longer a requirement — hasn't been for some time. But the ghosts of protocols past linger.

By the way, Novell's NCP contains the "keys to the kingdom" of Novell networking. And Novell also supports a NETBIOS emulator. So in a way, if you must use NETBIOS over a NetWare LAN, NETBIOS is encapsulated in IPX (sort of). Mr. Caro also states his companies' disinterest in any approach like this. I think this requires a different perspective. TCP/IP is just a transport mechanism that can support many higher layer protocols and services, such as Sun Microsystems, Inc.'s Network File System (NFS). Is this encapsulation or is it a completely different issue? I think it's not encapsulation, but different services running over a common transport protocol.

If NCP/IPX in its entirety was placed inside a TCP/IP frame (as is the case with Novell's earlier IP tunneling), then I would call it encapsulation. IPX and TCP/IP are peer protocols in that they are both Layer 3 and 4 protocols. Placing one inside the other is redundant and results in a larger overall frame, which wastes bandwidth.

I applaud Novell, Microsoft and even IBM for acknowledging that TCP/IP is important enough for them to provide tighter support for the world's most important and most widely implemented open systems protocol suite.

Buddy Shipley
President

Shipley Consulting International
Silver Spring, Md.

Hit the highway

What will the Information Superhighway really become? We have our dreams of global computer-based communications, accessing data freely around the world, digging through the Library of Congress from the comfort of our own homes and traveling down electronic boulevards of shops and entertainment.

In another time and place, there was a different view of what a world connected by wires

and electronic signals would be like. It was in 1984 — the book by George Orwell — that this vision of fear was best brought to imaginary life. Orwell depicted a world dominated by a single strain of thought, a dictatorial government, and intellectual, and cultural slavery. This world was held together via a one-way information highway controlled by a corrupt and narrow-minded government.

This vision dictatorship has been buried out of the sight and minds of many cyberspace zealots and electronic commerce entrepreneurs. It needs to be recalled to be avoided.

We desperately want the freedom to exercise communication and inquiry. This freedom has been paid for by the dying masses that dared to oppose dictators and tyrants throughout history. On one hand, the Information Superhighway may be the ultimate tool by which to pursue such freedoms. But the opportunity to control populations with an ease only dreamed of by fiction writers may tempt governments into a greater and darker corruption.

We do not trust government. This distrust is institutionalized in the concepts of democracy, including the right to bear arms, being considered innocent until proven guilty and the right to privacy. While very much a part of the foundation of democratic doctrine, none of these concepts has yet to be realized to its fullest potential. There remains a fierce struggle between people for freedom and their governments for control.

The electronic world cannot be exempt from the issues we face in our social and political lives. Censorship, government control, privacy, freedom of inquiry, social responsibility of service providers, licensing, regulation and universal opportunity are all issues that we must take with us into cyberspace. The fight for freedom is far from over.

Michael Erbschloe
Professor of information systems management
National University
San Diego

Whale of a column

Mark Gibbs' column "Disposing of the dead whales in your organization" (Aug. 1, page 20) was a great story and analogy. Keep up the good work. It's Gibbs' and Scott Bradner's columns that make me read *Network World* each week.

Don Mahler
Piscataway, N.J.

Error correction

Your otherwise informative article on the Internet Protocol next generation (IPng) has one error that should be corrected (Aug. 1, page 1). The proposed security mechanisms in IPng come in two complementary varieties, the first of which is not encryption-based. The Simple Internet Protocol Plus authentication header provides strong authentication without encryption. This authentication mechanism is intended to be exportable, mandatory and universally implemented.

The other security mechanism, which is optional, does use encryption to provide confidentiality to users who desire that.

Dan McDonald
Computer scientist
U.S. Naval Research Laboratory
Washington, D.C.

Editor's response: Authentication is considered a feature of public key encryption technology, but we appreciate your description of IPng security features that could not be included in our story due to space restrictions.

Help desk

Continued from page 2

or Western Digital Corp. NICs.

NAS 1.3 is no longer a Novell product; it was sold to Citrix Systems, Inc. last November, and now, Novell has no replacement product. However, in conjunction with Novell, Citrix has issued final enhancement patches for NAS 1.3 and OnLan PC, which are posted on CompuServe's NetWire. To download the patch files, type GO CITRIX to enter the Citrix forum. Next, type JOIN to join the forum. Select the "libraries (files)" option, and then select the NAS 1.3 directory. You can then download the patch files PTF430 and PTF365.

As another alternative, Citrix's WinView for Networks application server software is now being offered as an upgrade to NAS for \$1,595 for a 10-user system. With WinView, each DOS application can receive up to 630K bytes of conventional memory — about 40% more than NAS. For more information, call Citrix at (800) 437-7503.

You could also consider using a fractional T-1 in place of the 56K bit/sec line; a little more bandwidth might also help the problem.

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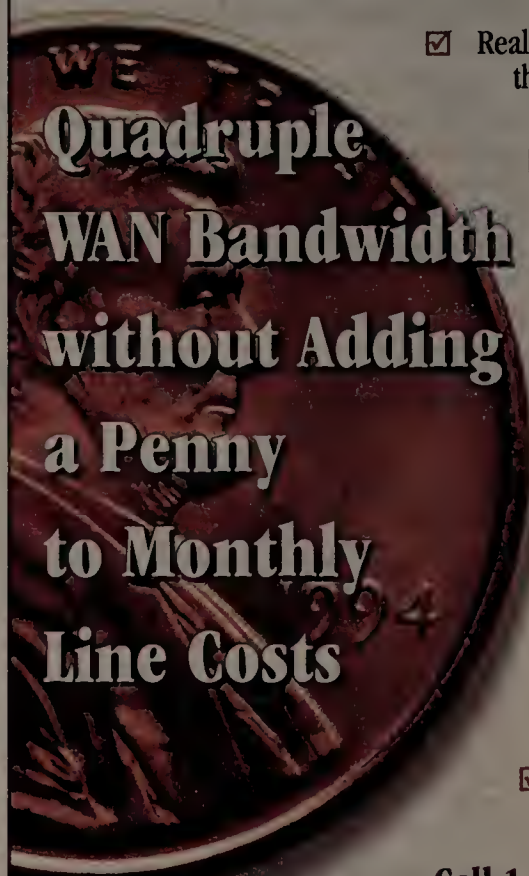
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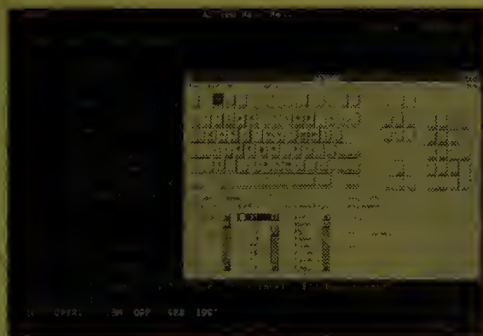
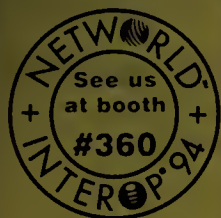
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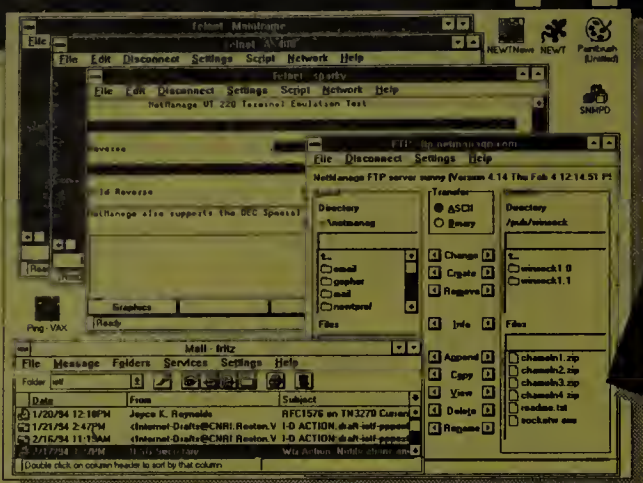
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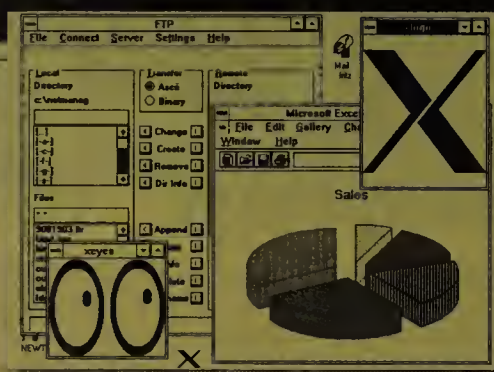
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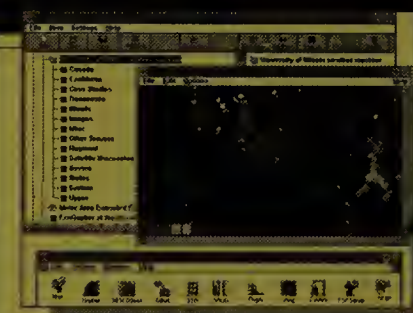
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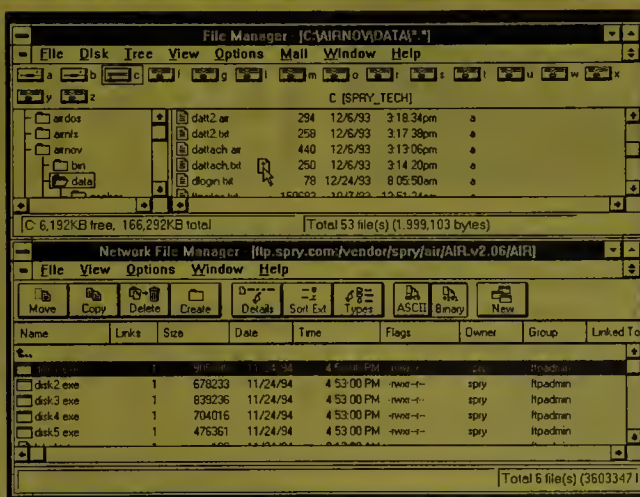
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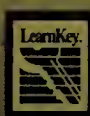
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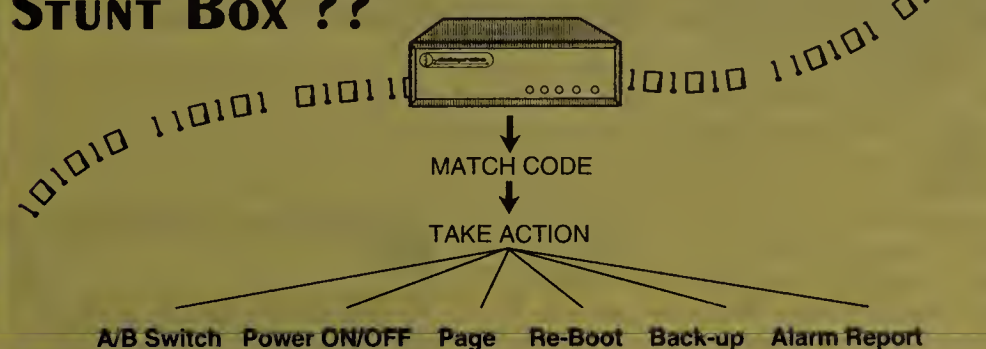
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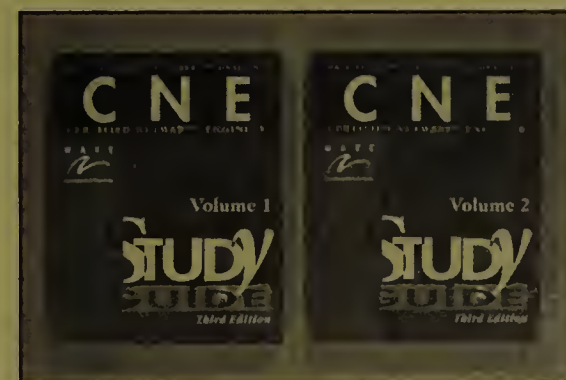
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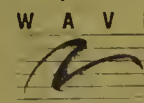
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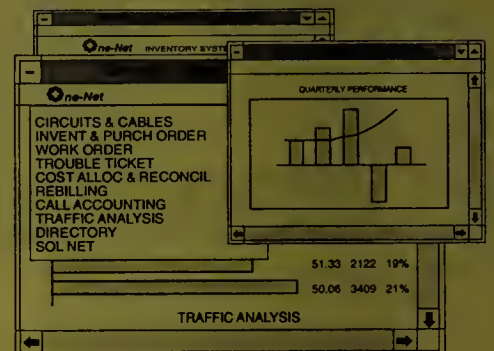
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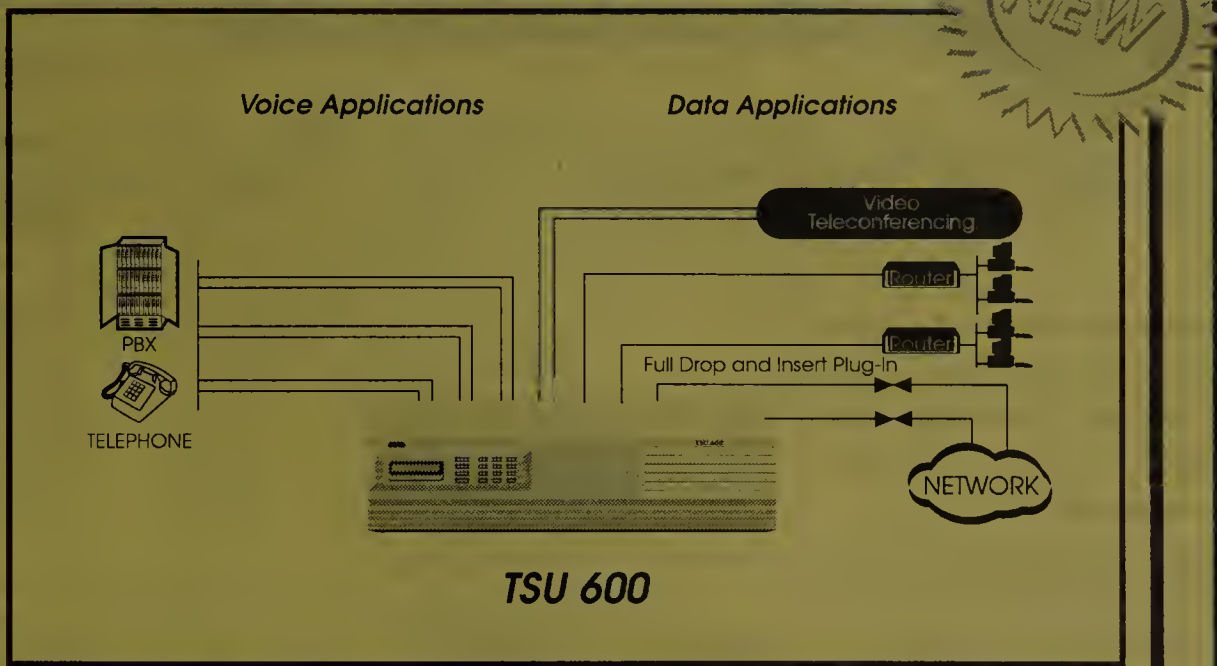
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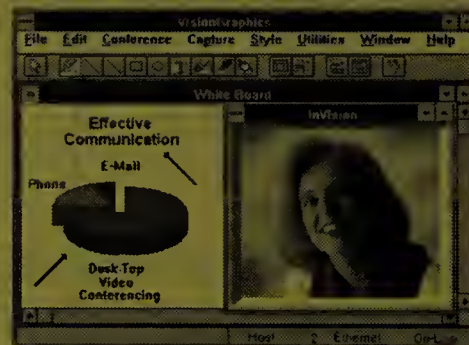
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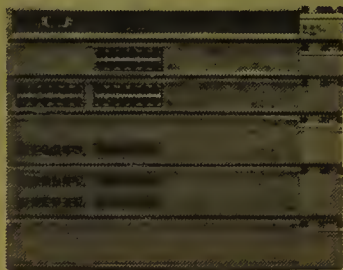


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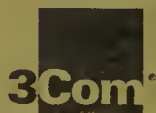


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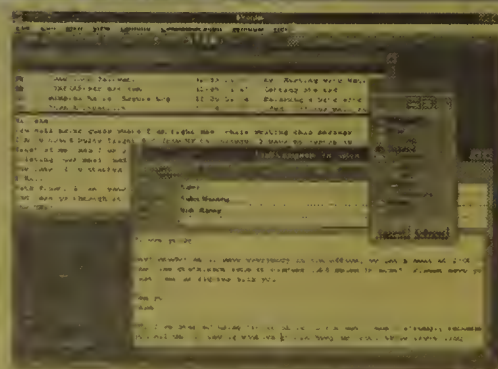
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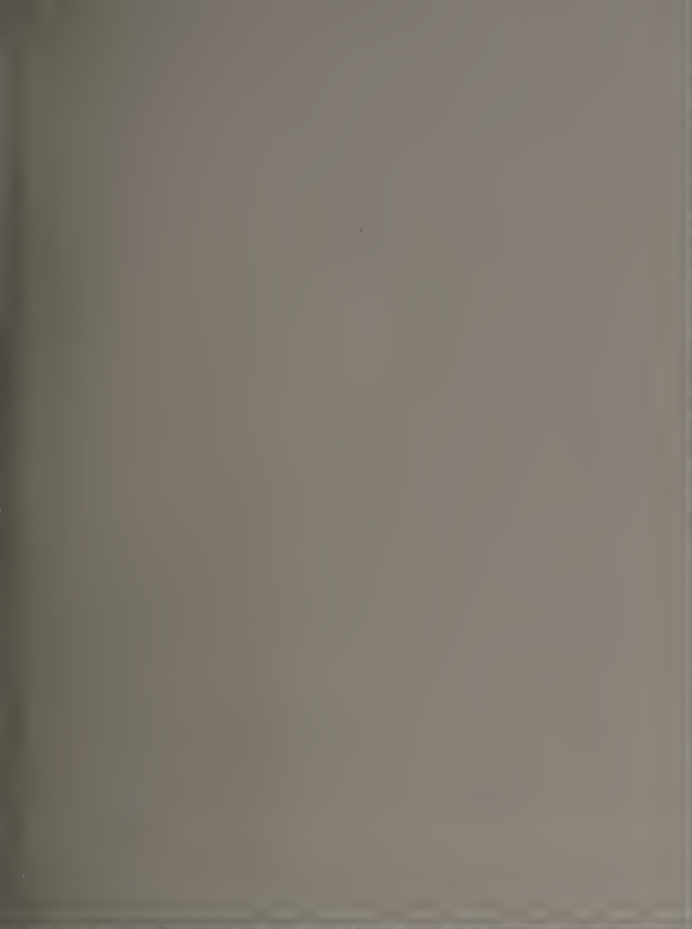
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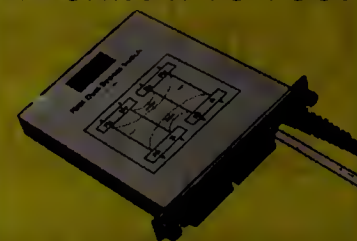
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TGV

Continued from page 1

equivalents, or they could encapsulate DECnet data inside TCP/IP and run both protocols over the network, which increases the load on network administrators and drags down network performance.

Phase/IP, however, can run concurrently with DECnet or DECnet/OSI. It interfaces to DECnet applications by loading the Netdriver-over-TCP driver into the Open-VMS kernel.

When used with Open-VMS AXP 1.5 or OpenVMS VAX 6.1 or later, Phase/IP lets users address full-TCP/IP domain names directly. When used with earlier OpenVMS versions, users will need a mapping table to address nodes with names limited to six characters.

"This is the most important release we've had since the original release of MultiNet," said Craig Conway, president and chief executive officer of TGV.

Phase/IP will go up against Digital's own "DECnet/IP" software, due out next spring (NW, July 11, page 13).

Both products have drastic implications for DECnet/OSI adoption. Most Digital users are already balking at migrating from DECnet Phase IV just to support current DECnet applications when upgrading the OpenVMS operat-



CONWAY

ing system. Moreover, Digital and non-Digital users have adopted TCP/IP as the standard protocol for multivendor networking, and not Open Systems Interconnection, which is integral to DECnet/OSI.

Migration to DECnet/OSI currently requires users to learn new naming, addressing, routing and network management conventions.

"Our implementation of DECnet/OSI had slowed to a snail's pace because of difficulties with name servers and things like that," said R. Kevin Oberman, engineering network manager at Lawrence Livermore National Laboratories in Livermore, Calif. "[Phase/IP] makes it as easy to have DECnet now as it was in the days of Phase IV. We no longer have any particular reason to implement DECnet/OSI."

TGV may have a competitive edge over Digital. TGV is the leading vendor of TCP/IP for Digital shops, and Phase/IP will ship in November, at least a quarter before DECnet/IP.

But Digital remains undaunted. DECnet/IP will work with multiple vendors' TCP/IP stacks, whereas Phase/IP requires MultiNet, said Mary Ellen Fortier, DECnet/OSI marketing manager.

Phase/IP is priced from \$360 to \$7,200, depending on the type of VAX or Alpha processor on which it will run.

©TGV: (408) 457-5200.

Phone fraud

Continued from page 6

to leverage AT&T's "stakeout" monitoring software — on-line since June to alert customers to phone switch vulnerabilities — to identify hackers as they create a dial-tone path through a PBX. AT&T and the customer would then contact law enforcement officials to try to catch the perpetrator before fraudulent calls are completed.

While AT&T has long had security products and has helped users diagnose fraud, until now, it has had no official team charged with following through on catching criminals. AT&T is instituting the investigative measures as part of its PBX customers' standard maintenance contract.

One reason to catch the hacker up front is that once fraudulent calls are being made, the original hacker may be long gone, said Kevin Hanley, AT&T's marketing communications director for security products.

But the measure will be only one in a fraud-fighting industry's bag of tricks.

"It's a great goal to snag them their first time through the door, but it's unrealistic," said Mike Gogulski, a convicted hacker in Orlando, Fla., who estimated the strategy will work 5% to 10% of the time. "Usually, as a telecom manager, you find out in the morning you've been hit the night before."

Another obstacle is that prosecutors tend to look at the dollar amount of a

crime when prioritizing who they punish, said Jim Snyder, special counsel for systems integrity at MCI Communications Corp. in Washington, D.C. and a former federal prosecutor.

Fiddling with someone's PBX is in itself a crime, but the activity does not cost the victim anything until someone places a call. This makes it less likely that the hacker will be prosecuted.

To foster a team approach to protection, the Federal Communications Commission recently issued notice of proposed rule-making that could require users, PBX makers and carriers to share financial liability for phone fraud losses.

Some think that team should include the regulated local Bell phone companies, which collect their access fees from the long-distance carrier whether or not the long-distance carrier can bill for the call.

With the exception of Pacific Bell, most local carriers "aren't doing much because they aren't eating any of the costs," said Sally York, communications systems manager at financial firm USL Capital in San Francisco. York, whose firm was a victim of PBX fraud in 1991, is on the security committee of AT&T's National Definity Users Group.

The formation of AT&T's SWAT team follows its pronouncement that it will now impound 800 numbers that are misused, preventing abusers from taking their numbers with them to another net. ☐

Switching

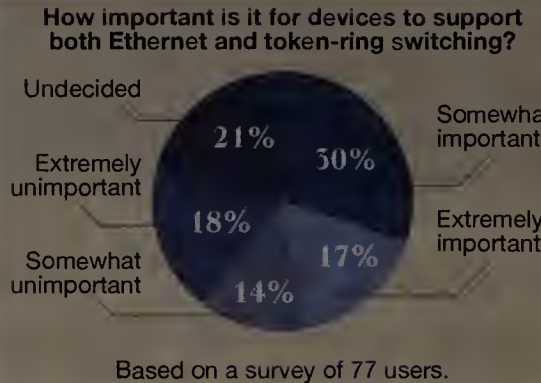
Continued from page 1

Even hub makers such as Cabletron Systems, Inc., SynOptics Communications, Inc. and LANNET, Inc. plan to offer switching mechanisms that can accommodate token-ring frames as well as Ethernet packets.

Why this sudden burst of interest? Token-ring networks keep growing, and that growth invariably increases the demand for more bandwidth.

According to a study from Sage Research, a consultancy in Natick, Mass., an overwhelming majority of

Turned on by token-ring switching



How likely are you to use the following mid-speed network technologies?

(Scores based on a scale of 1 to 5, with 5 being highly likely and 1 being highly unlikely.)



GRAPHIC BY TERRI MITCHELL SOURCE: SAGE RESEARCH, NATICK, MASS.

the 77 large token-ring shops surveyed are planning to expand their networks during the next two years.

"These users are feeling the same bandwidth crunch as their Ethernet relatives," said Kathryn Korostoff, a principal at Sage. "The majority of token-ring internetworks are bridged, and that leads to a bandwidth bottleneck at the backbone as the number of rings and users grow."

"Token-ring switching for us will be implemented initially as a way to replace existing bridges," said Steve Toce, engineering consultant at The Travelers Corp., an insurance company in Hartford, Conn. "The switching technology will allow us to more efficiently interconnect token-ring segments and give dedicated bandwidth to servers and a few power clients."

For other users, a move to switched token ring will obviate the cost of adding expensive router ports every time a network needs to be further segmented.

One large health insurer in Connecticut, for example, cannot wait to get its hands on some proven token-ring switching technology because the price for expanding its router-based internet is simply too high.

"Because of our growing number of users and a push to do more client/server computing, we've outstripped the bandwidth available to us in our Cisco 7000 backbone router," said the user, who requested anonymity. "With 1,600 PCs and printers on our token-ring net now and an additional 500 likely to be added next year, I simply can't afford to keep adding router ports."

The decision to embrace switching was an easy one after the user saw there was no need to route within a campus environment.

"Routing introduces end-to-end latency," he said. "That latency had a negative impact on users trying to access the 30 devices attached to our backbone. With switching and dedicated 16M bit/sec pipes to those devices, latency is basically eliminated."

Token-ring switching will compete against Fiber Distributed Data Interface links to backbones — a configuration that many users currently employ since the two token-based technologies complement each other.

CDMA

Continued from page 27

complex — and, initially, expensive — electronics. That could actually render it more expensive than its competitors in low volumes.

And the benefits of CDMA are highly dependent on radio and system design to increase the threshold of tolerable interference.

"CDMA must perform as advertised," said Dan Merriman, director of mobile communications services at BIS Strategic Decisions in Norwell, Mass.

"Then you have to get [usage levels up] for it to be cost-effective. I don't think subscribers will feel the capacity crunch until well into the next decade."

The CDG hopes to see CDMA products and services reach the market by the second half of next year, said Ron Foerster, an executive board member.

Basic industry standards are in place for the CDMA interface. But the CDG would like to rev up the formal approval process and see new features added, such as short messaging services, over-air service activation and packet data services, Foerster said.

The CDG will also provide for multivendor interoperability testing, he said.

CDMA'S NEMESIS

CDMA's key rival as a digital cellular standard is Time Division Multiple Access (TDMA). The U.S. industry standard for TDMA has been rolling out in

products since 1992 and is nearing 80,000 subscribers, according to BIS.

There is a separate European standard for TDMA, as well as many proprietary TDMA flavors. Combined, the various TDMA nets today serve about a million subscribers worldwide.

TDMA is simpler and thus less expensive to deploy in low volumes than CDMA. While its estimated capacity jump over analog cellular nets is usually pegged at threefold, a group called the TDMA Forum has enhanced the TDMA specification in an attempt

to match CDMA's tenfold capacity leap, said Rod Miller, regional sales manager at Ericsson Radio Systems in Richardson, Texas, a TDMA advocate.

A working group within the TDMA Forum is scheduled to begin interoperability testing of the enhanced spec, which uses a hierarchical cell structure, in the fourth quarter, he said.

All wireless nets today are based on analog technology, which accounts for some of their reliability and quality drawbacks. CDMA and TDMA are potential

new infrastructures that could solve those problems.

Presuming standardized versions of both CDMA and TDMA flourish, though, users will have to settle for a lowest common-denominator level of interoperability. Since CDMA and TDMA are inherently incompatible, most dual-mode telephones sold in the future will support a combination of CDMA and analog cellular or TDMA and analog cellular, analysts said.

Calls between TDMA and CDMA devices, then, would default to analog cellular communications with its corresponding limitations. ☐

CDMA Development Group's mission

- Get CDMA commercialized by the second half of 1995.
- Foster evolution of CDMA standard.
- Promote interoperability testing among vendors.

Experiment

Continued from page 1

ers will gather in Boston to commemorate their pioneering work, when the ceremony sponsored by Bolt Beranek and Newman, Inc. (BBN), the company chosen to build the net's first messaging switches.

The founders will stroll down memory lane, recalling their packet switching development efforts and the birth of Transmission Control Protocol/Internet Protocol, which today has perhaps become the de facto standard for open systems-based networks.

The ARPANET pioneers will also look forward. They foresee continued exponential growth for the Internet — provided it can overcome a series of technological, economic and political obstacles. Many of those hurdles are coming to the forefront as the Internet is reengineered to handle growing demand and ever more complex applications, they said.

CERF'S UP

Vinton Cerf, who helped develop TCP/IP, summed it up this way: "Now we've got this damned airplane in flight; How do we change engines without crashing the thing?"

Cerf recalled how the original version of TCP, released in 1974, had provisions for only 256 networks.

At the time, nobody thought there would ever be more than 10 or 15 networks, in large part because of the expense of linking them together. That was, however, before Robert Metcalfe developed the specifications for Ethernet.

Cerf, now president of the Internet Society and senior vice president for data architecture at MCI Communications Corp.'s Data Services Division, said the Internet needs billions of new potential addresses for the day when packet communications devices become ubiquitous and the Internet becomes a channel for voice and video, in addition to data.

The IETF settled on a proposal known as IP6, or IP next generation (IPng), to address this and other issues (NW, Aug. 1, page 1).

But Cerf predicted that the Internet's growing popularity will also mean fundamental changes to its pricing structure, in which a firm essentially pays for a given bandwidth pipe without any time-based charges.

Internet providers will have to devise ways to charge users for high-bandwidth

applications including videoconferencing. "Ultimately, somebody has to pay for all the capacity being used," he said.

As the Internet becomes a commercial medium — already half the traffic on the net originates at commercial sites rather than educational or research facilities — users will begin to demand better privacy measures and user authentication, Cerf explained.

He predicted that the Internet will increasingly be used to sell information, although he acknowledged that will first take solving intellectual property issues — such as how to keep someone from making an unlimited number of copies of a copyrighted document.

THE HARDWARE ENGINEER

In 1969, Ben Barker was fresh out of Harvard when he took a job with BBN as a hardware engineer. One of his first jobs was to help convert a Honeywell, Inc. computer into an interface messaging processor — essentially a router — for what would become the ARPANET.

Today, as a senior vice president and chief technology officer at BBN, Barker sees an Internet where the innovation may have only just started.

But he said he worries about what will happen if government or time-based pricing hits the Internet.

"It's the very unregulated nature of it that makes it so appealing," he said. Anyone can become an information provider at little or no cost through the World-Wide Web, which itself is an example of an application that has quickly spread across the Internet.

The marginal cost of using the net "makes it so that all kinds of clever people can develop clever applications," he said.

And Barker disagreed with Cerf's contention that changes are needed in Internet pricing, given improvements in the cost/performance ratios of routers and other technologies.

Some 25 years ago, BBN built a communications switch that could move data at 200K bit/sec, which sold for between \$50,000 and \$100,000. Today, BBN is developing a switch with speeds of 2G bit/sec for the same price, he said. It's a ratio that dwarfs even that of increases in central processing speeds, he said.

One downside to the Internet's growth will be a "substantial displacement of jobs," as telephone companies lose business, Barker predicted. The

result could also be a push by carriers for government regulation of the Internet.

THE PROFESSOR

Kleinrock, who helped oversee the creation of an ARPANET network management center at UCLA, will be involved in studying how the government changes the Internet. He is chairman for a National Research Council task force looking at ways to build the National Information Infrastructure.

"Huge sums of money are about to be spent," he said.

Vital is government oversight to ensure that this new infrastructure can handle what are now disparate forms of communications.

"There is no one overriding vision" at this point of where a digital nation should be heading, he said.

Kleinrock said he worries about the potential for failure as the Internet grows larger and more important — and as its software grows more complex. "There is the potential for enormous disasters," he said.

Any net crisis will likely come about because of some unforeseen software glitch rather than a hardware problem, he predicted.

Internet advocates point to the net's self-healing ability — packets get routed around trouble spots.

But Kleinrock noted that a similar capacity was promised for telephone switches, which in have sometimes failed due to obscure software problems.

But Kleinrock sees no end to the network's growth. "It's going to pervade our life," he said.

Next week: Part 2 will cover where users see the Internet in the future.

ARPANET fades away. First piece of mail between commercial E-mail vendor, MCI, and the Internet is exchanged.

Gopher is introduced.

World-Wide Web is launched.

White House opens Internet mailbox.

IPng is released.

Morris worm focuses public attention on Internet.

NSFNET, with a 56K bits/sec backbone, is started.

University of Wisconsin adds E-mail.

USENET begins.

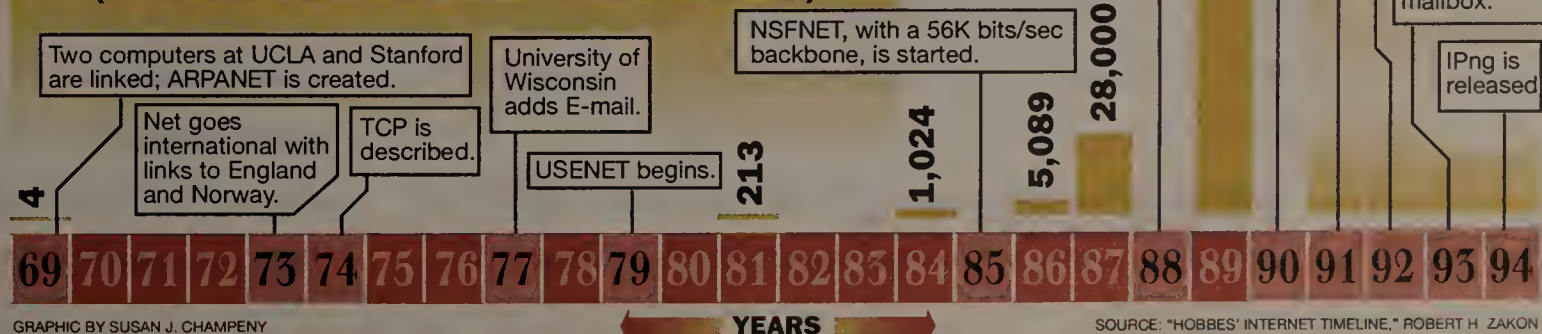
TCP is described.

Net goes international with links to England and Norway.

Two computers at UCLA and Stanford are linked; ARPANET is created.

Tracking the Internet's 25-year history

(Vertical bars indicate number of Internet hosts.)



GRAPHIC BY SUSAN J. CHAMPENY

YEARS

SOURCE: "HOBBS' INTERNET TIMELINE," ROBERT H. ZAKON

Paul Scholes, local network systems manager at Farmland Foods, Inc. in Kansas City, Mo., will evaluate FDDI and switched token ring to deliver more bandwidth. "We're looking at the 100M bit/sec solution from Madge to get better performance for a few central devices attached to the backbone, such as our network management console," he said. "Madge is also pushing a switched token-ring product that we will likely evaluate down the road."

There are, however, some applications that could use a dedicated 4M or 16M bit/sec connection to the desktop.

Toce mentioned some computer-aided design and manufacturing applications for engineering that Travelers might benchmark with token-ring switching, while Scholes said some database and electronic mail applications may warrant such bandwidth need as each are used extensively in his environment.

If a token-ring switching product can also provide some Asynchronous Transfer Mode (ATM) capabilities and help the user migrate to a cell-based switching environment, all the better, according to Toce. "Token-ring switching gives me a logical, interim step in my migration to an ATM environment," he said. "It means no huge leap in mind-set and technology in moving from shared to switched nets."

Switched token ring may also impact the need for 25M bit/sec ATM for many token-ring users.

"Switching will definitely have a negative impact on low-speed ATM in token-ring environments," Toce said. "Do I want to invest a ton of money to install a new technology that only gives me a 10% performance gain over something that is relatively inexpensive and easy to use? No thanks."

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Comments?

See "Contacts" box on page 2.

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